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EDITORIAL.

IT IS REPORTED from Utah that a consolidation of the large silver-lead producers of the Park City district has been arranged. It will include the Daly, the Daly-West and the Silver King, with possibly some other properties. The deal has been managed, it is said, by Mr. Sweeney and others, who are concerned in the Federal Mining & Smelting Company, which last year consolidated a number of properties in the Cœur d'Alene district. This is an important movement, and will tend to bring the business of lead production in this country still further under the control of a single group of interests.

THE REPORTED sale of one-half interest in the Negaunee mine on the Menominee iron range in Michigan for $750,000 shows the high value still attaching to the old range mines; and also the necessity which steel companies now find of controlling their own supplies of ore. The Negaunee is one of the properties owned by the Cleveland-Cliffs Iron Company, and the reported purchaser is the Lackawanna Steel Company, which is just completing its extensive works near Buffalo. The company already owns several iron leases, and the new purchase is probably intended to secure an additional supply of hard ore.

THE NOTE FROM Dr. Phillips, head of the Texas Mineral Survey, which is given on another page, indicates a considerable addition to the known quicksilver deposits of Texas. Further explorations are to be made; but the work already done shows the probable existence of cinnabar in considerable quantities. An addition to our capacity for the production of this metal is very desirable. For this reason the discovery is of importance.

IT IS HUMAN NATURE, after all, that one of the most important and successful mining companies in the world should be one which is engaged in producing, not a useful metal, or a money metal, but precious stones, which the philosopher looks upon as a mere superfluity.

The report of the De Beers Consolidated Mines, given on another page of this issue, shows the production and sale of diamonds amounting in value—or rather price—to $25,000,000 in a year, at a profit which enabled the company to pay 40 per cent on its preferred and 55 per cent on its ordinary shares, and to carry over $3,750,000 in undivided profits. Moreover, the company carries a reserve fund of $9,500,000, invested in the best securities, to provide against any possible period of hard times. If diamonds are only a luxury, it seems that the world must have them.

WHITAKER WRIGHT.

The sordid tragedy which was brought to an abrupt end last Tuesday afternoon must have thrown a chilling shadow over the financial arena of London; but tragic as was the final close to Whitaker Wright's career, it was less regrettable than the untimely blight which fell upon the reputations of some of the distinguished men whom he dragged to disaster, and not nearly as sad as the ruination of the thousands who were duped by his operations.

Several lessons can be drawn from the life, punishment and death of Whitaker Wright. A man without principle may mean well, but will stop at nothing when once the logic of events goes against him. English company laws are adequate to sift bogus finance and punish wrong-doing to a degree unknown, for instance, in New York. Compare London & Globe with United States Shipbuilding. It is also evident that those who take great risks which they imperfectly understand, in order to get rich quickly, court an inevitable disaster, and whether they be irresponsible promoters or men of high achievement, the punishment is equally sure. Dufferin and Wright were wide as the poles asunder in everything save their eagerness to reap great profits by risky speculations; both paid the penalty.

Finally, the whole unhappy story points with straight finger to one conclusion, and that is, that inexperienced men make no better than dummy directors. The fate of the distinguished men whose support Wright secured, and the equally sad experience of the shareholders who put their trust in pro-consuls and military commanders, should forever speak eloquently against the fatuous practice of putting men ignorant of mining and mining finance upon the directorate of large mines, or any mines whatever. Because the titled incompetents whom Wright victimized, and who in turn victimized the unfortunate investors, were men of notable achievement in other walks of life, therefore the emphasis is all the greater, and we hope the final tragedy of Tuesday will draw the attention of those who have at heart the well-being of legitimate mining to the absolute necessity of putting an end to the dangerous farce of electing inexperienced men as trustees for shareholders.

AN OLD FOLLY REVIVED.

The vitality of a fallacy is proverbially great; one of the toughest appears to be the notion that a process can exist which will extract, profitably and on a working scale, more gold than can be determined in an ore by the fire-assay. The name of Beam has been associated with such claims for a great many years. By reference to our files we find that in 1888 and again in 1897 the Beam process was made the subject of statements the absurdity of which was exposed in these columns. By the use of a muffle of special design and by the admixture of salt and sawdust, more gold was claimed to be extracted from ores than was detected by careful fire-assay; several moribund mining enterprises were to be rejuvenated by Mr. Beam's alchemy and vast bodies of low-grade ores were to be rendered profitable.

As was pointed out at the time, the emphasis on the inaccuracy of the ordinary assay means one thing to the technical man who understands that there are limits to human skill, but it conveys a wholly false notion to the public, who are led to the belief that the limit of error is big enough to represent a margin of profit for any method which can do a little better, even on ores usually discarded as so poor as to be beneath the reach of ordinary processes. As a matter of fact, the fire-assay, when properly conducted, exceeds in accuracy any of the ordinary methods of ore reduction, and when a smelter, for instance, extracts an aggregate of gold greater than that paid for, on assay of samples representing a large number of ore shipments, this result is due to the cumulative effect of minute quantities scattered through a number of lots, some of which contain gold below the minimum on which, according to contract, any payment is allowed. In the same way, certain lead ores in the crude state may not carry enough silver to be appreciable, yet what there is may become so concentrated in the pig lead as to yield a notable silver content, warranting extraction by subsequent refining.

At the present time the Beam process is the mainstay of a mining excitement in the Wichita mountains, in Oklahoma. The *Roosevelt Record* supplement contains assays of samples calculated to encourage fictitious hopes. As a matter of fact, government experts have recently examined, with great care, a large number of the best developed prospects in the region referred to, trying in each case to get fair samples of the presumed ore, and, when nothing at all appeared to be of value, they secured, from the owners, samples of the same sort as those in which the Beam assayers had found values. Upward of 300 lb. of samples were shipped to Washington and 71 separate assays were made; large quantities were used and every possible precaution was taken, yet not a trace of gold was found in any one of the samples. The whole excitement appears to be a fraud of the first water, and we would warn persons who might be misled by statements such as those emanating from the township which is doing dishonor to an honorable name.

THE DEADLOCK ON STEEL RAILS.

While the demand for iron and steel is, apparently, slowly recovering from the paralysis which attacked it in the closing months of last year, the attention of the trade is fixed upon a contest over an important point, which is now going on. The parties to this both seem determined, though they are saying but little in public. For the time there is almost a complete deadlock in this branch of the steel business. The contest is over the price of steel rails, and on both sides there are powerful interests. Which side can hold out the longest remains to be seen. A year ago the rail-mills had orders enough on hand to carry them well through 1903 and into the present month; now contracts are few, and some of the mills will very soon be bare of work, unless orders begin to come in. There is work enough, and the railroads have money to pay for it; but they are holding back, apparently by common consent, until an adjustment can be reached.

The so-called rail pool, which includes all the mills rolling steel rails, fixes prices at meetings of the representatives of the companies held at varying intervals. All through last year the price of standard sections—that is, of rails weighing over 45 lb. per yard—was kept at $28 per ton at mill. During the period of high prices in 1902 and the first part of 1903, this figure was maintained, regardless of the price of other finished products. For months the unusual condition prevailed of steel billets selling at $4 to $6 higher than finished rails. A steel rail of large section is one of the simplest forms of rolled products, though the quality of the metal is usually defined by rigid specifications. Nevertheless, it used always to be considered that rails should bring $4 to $5 per ton more than billets; but last year the conditions were reversed.

Now the prices of the raw material—pig iron—and of most finished products have fallen materially, but the rail pool still maintains its price of $28 at mill. The railroads—or such of their representatives as have made any statements at all—claim that they should have the benefit of corresponding reductions on their contracts. This, they say, is especially their due, as they have sought to help the makers by lower rates for transportation on material for export, and in other ways. The rail-makers, on their part, claim credit for the uniform price maintained through the period of great activity; and claim, also, that a re-

duction in prices would involve losses which they are not prepared to stand. So far as the argument goes, there is doubtless a good deal to be said on both sides.

The active work of the rail-mills for the past two or three years has not been due in any great degree to the construction of new railroad lines. It has been, to a considerable extent, the rolling of rails of very heavy section, which are required by the increase in weight of locomotives and rolling stock. A large proportion of the rails replaced have been in fair condition, good enough for use on sidings and on branch lines of moderate traffic. On more important lines, rails of 90 or 100 lb. to the yard are in common use, and the Pennsylvania Railroad has even put some 130-lb. rails on sections where the work is especially hard. With these very large sections the work in the mill is less in proportion, and this should be considered in fixing the price. To claim, however, that the present quotation permits extravagant profits to be made is an exaggeration frequently met with; though we do not pretend to say that a moderate reduction would deprive makers of all profit.

Meanwhile the mills are still looking for orders. The rail capacity will be increased this year by the large mill of the Lackawanna Steel Company at Buffalo, and by the Tennessee Company's mill at Ensley, in Alabama. Apparently, however, they prefer to wait rather than to make concessions, for there is no probability of a break in the pool. On the other hand, the railroads are not under the pressure of extreme necessity. Most of them have been put in good condition during the years of prosperity, and renewals can be postponed for a few months without doing much harm.

It is a pretty deadlock as it stands. It concerns others also, since the breaking of it would give a start to business in other branches of the steel trade, which would be quickly felt.

HUNTING FOR RADIUM.

The popularizing of facts concerning radium and its compounds has led to the dissemination of a great deal of pseudo-scientific writing in the daily press, and this has now brought forth a harvest of alleged discoveries of radium deposits, such as promise to become a basis for swindling the public.

The New York *Sun* prints a foolish telegram from New Orleans stating that "Rumors of the discovery of earth bearing a large piece of radium in the Llano have been persistent for some time, and to-day these rumors were verified by the return of a party of scientists who had visited the mine to investigate the report." It is no wonder that a local paper in Utah waxes enthusiastic over the discovery of uranium oxide in that State and goes on to say: "As radium, like uranium, can be found only in carnatite, and that these twin metals are as closely associated as the letters q and u, the certainty of radium is established."

The number of analysts able to isolate radium can be counted; radio-activity does not entail the presence of radium; many minerals are radio-active which are barren of radium itself. Assayers and chemists in mining camps have no means of making tests for the element; if they pretend to do so, they are charlatans. The separation of radium from its ores is a difficult and extremely tedious process, only to be carried out in a specially equipped laboratory by expert chemists. It is also to be borne in mind that pure radium has never been produced; the material thus far obtained is an impure salt containing a variable proportion of the element, usually in the form of chloride. There is little probability that the production of radium will ever become an important industry, despite the enthusiasm with which new discoveries of ores are heralded from day to day, much of which is evidently being used in order to form secondary enrichments in the pockets of irresponsible people.

THE HARWICK MINE EXPLOSION.

On January 25 the mine of the Allegheny Coal Company at Harwick, a little hamlet near the West Penn Railroad, some 16 miles northeast of Pittsburg, was wrecked by an explosion. The mine was a shaft opening, and presumably its equipment was excellent, since it was a new opening not appearing on the list of mines in the mine inspector's report for 1902. According to the press dispatches the longest gangways had been driven but half a mile from the foot of the shaft. It is also stated that the miners carried safety lamps.

The work of rescue is in progress as the JOURNAL goes to press, and the real loss of life is still uncertain. It is fairly certain, however, that over 165 men were underground, and it is likely that all of these perished. The accident may thus surpass in loss of life the terrible Rolling Mill mine explosion at Johnstown, Pa., in May, 1902, which cost the lives of 112 persons. The cause of this last disaster cannot be told until after a careful examination of the mine, and the terrific force of the explosion may have so wrecked the workings as to make a precise verdict impossible. However, the matter calls for some comment.

In the first place, it is fairly certain that the mine should have had every provision for safety called for by law. New mines are usually better equipped than old ones. Again, as the Pennsylvania bituminous regions are now divided into 15 inspection districts, there is no excuse for an inspector not preventing any attempts to evade the law, for he can inspect often mines where conditions are not what they should be. The Harwick mine was inspected in December. It is likely, therefore, that, as was the case with the Rolling Mill explosion, a deliberate violation of orders by some miner caused the disaster.

The explosion furnishes another example of that heroism which is too often the only bright incident in a tale of horror. Selwyn M. Taylor, of Pittsburg, the consulting engineer who laid out the work underground, was one of the first party to descend the shaft, and was overpowered by gas. His body has been recovered. Such single-minded devotion to the duty of the moment should call attention to the necessity of better methods and improved apparatus for rescue work in mines after explosions whether accompanied or not by fires. In the present case it is likely, in spite of the force of the explosion, that most of the men were killed not by shock but by suffocation. The accounts go to show that Mr. Taylor was overcome by the deadly white damp (CO) that may give no indication of its presence till the victim falls unconscious.

Various types of rescue apparatus have been devised. Those depending on bringing a supply of oxygen to the wearer from some distance through a rubber tube are hardly suitable for a rapid advance. Several types of portable apparatus having a knapsack charged with compressed oxygen have been tried in several European countries with good results. As in all cases, where an explosion is not followed by fire, the chief danger is from carbon monoxide, it would seem that a simple respiration apparatus having a wet sponge saturated with cuprous chloride ($Cu_2 Cl_2$) might be of great value in an emergency. At any rate there is clearly need of our coal mining companies adopting apparatus to save the lives of those entombed and to protect the members of rescue parties.

MARKET CONDITIONS.

January 27, 1904.

The metal markets generally continue rather quiet, and no special incident of any kind has marked the week.

In copper, domestic buyers are still holding back, while the foreign demand seems to have been satisfied for the present. Exports continue large, but they are mainly on old contracts.

Tin shows no material change, but, as usual, there have been several fluctuations in the price.

Lead continues firm and unchanged, the demand for immediate consumption being apparently better than in any of the other metals.

Spelter is also firm, though without any great change in demand. In the Joplin ore market prices have been a little higher, and the stocks of ore have been generally cleaned out.

Silver is dull, in the absence of any special demand. There has been some buying for the

East on private account, but the Indian coinage purchases are at an end for the present.

The iron markets show little change this week, though the waiting policy seems to be finding its effect in various concessions made by sellers to secure business. The deadlock on steel rails still continues, and is affecting the whole trade to some extent.

The Western coal trade continues fairly active, demand for steam coal being generally better. The joint convention of operators and miners holds its first meeting on Thursday of this week, but it will probably take some time before any settlement is reached.

The seaboard bituminous trade remains quiet in spite of increased consumption due to cold weather.

The anthracite trade continues seasonably active, the demand being strongest at those points where supplies are smallest.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

It is said that only five or six out of the 65 mines on the Rand could be worked at a profit but for the use of the cyanide process.

In the Treadwell group of mines on Douglas island, near Juneau, Alaska, 1,000 stamps are dropping the year round, reducing nearly 5,000 tons of ore daily.

The lead used in the storage battery, which is commonly known as 'sponge' lead, is not the ordinary metal, but an allotropic form; its conversion into ordinary lead is accompanied by the production of heat.

The lead storage battery consists of sponge lead for the negative and peroxide of lead for the positive element and an electrolyte of sulphuric acid. The two elements can be readily distinguished by their color; the peroxide plate has a velvety chocolate appearance, while the sponge lead is a light gray.

Tin has been found in tourmaline granite dikes at Heemskirk in Tasmania. This tourmaline is regarded by Mr. George A. Waller, assistant government geologist, as an original constituent of the rock.

The progress made in introducing improved methods and machinery in mining during the last half century is reflected to a marked extent in the decreased rate of mortality among miners. Fifty years ago the annual death-rate from accidents in the mines of the United Kingdom was more than 5 per thousand of miners employed; in 1901 it had sunk to 1.32 per thousand.

An interesting experiment is being carried out in the Waikaia district of New Zealand. The tailings from a dredge have been leveled and sown with white clover; it is springing up with vigor and, being a deep-rooted plant, it is hoped a permanent foothold will be secured. This experiment should commend itself to the people of Oroville, California, where the dredges are playing havoc with valuable fruit orchards.

In the museum at Turin there is preserved a papyrus manuscript, believed to have been written in the 13th century B. C., which describes gold-mining operations as carried on by the ancient Egyptians. It refers particularly to the mines of Akita, which were mentioned later by Diodorus, and were probably situated in the desert south of Assuan. The description is accompanied by a map showing the general plan of the workings, the wells, roadways and dwellings of the miners.

GAS ENGINES FOR A PUMPING PLANT.—The use of gas engines in a large pumping plant is somewhat of a novelty; but it is to be tried in Philadelphia, where a pumping station is being erected to take water from the Delaware river for use in case of fire. The pumping station will contain ten 11½ by 12-in. vertical, direct-acting Deane triplex pumps, each capable of delivering 1,200 gal. per minute at 40 revolutions, against a pressure of 300 lb. per sq. in. There are also two 6¼ by 12-in. pumps of the same type of 350 gal. capacity per minute. These pumps are to work together or singly, as may be desired, and all will discharge into a common 20-in. main. The water supply for the pumps will be taken directly from the Delaware river through a 36-in. suction main. Only seven of the larger pumps are being installed at present. Each of the large pumps will be driven by a 280-h. p. Westinghouse, three-cylinder, single-acting gas engine, and the small pumps by engines of the same type of 12.5-h. p. each. The pumps will be run only as required, in case of fire in the district covered. The selection of gas engines for motive power is novel, but is believed to be justified in view of the perfection of the modern gas engine as regards reliability and freedom from breakdown. The great advantages incident to the use of gas engines are their economy during periods of idleness, as compared with steam plants, and the ability to start up immediately and at full power.

AN OBITUARY NOTICE OF THE SILVER MINES AT CANDELARIA, NEVADA.

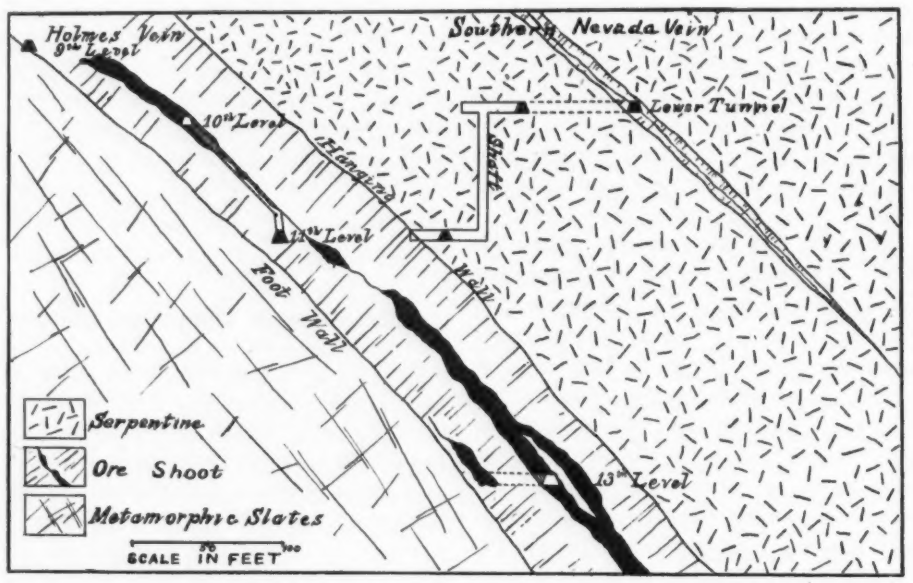
By H. W. Turner.

The mines at Candelaria, in the Columbus mining district, Nevada, were discovered previous to 1870, and continued producing until about 1885; possibly later. The most prominent of the group appear to have been the Northern Belle and the Mt. Diablo.

There does not appear to be in print any account of the geology of these properties except a brief statement by G. F. Becker[1] in the Tenth Census reports.

This is somewhat surprising, as these mines are credited with a product of about $15,000,000. In the publication by Becker, referred to, it is stated that "The Northern Belle is sunk on a series of irregular deposits, which is in general conformable to the slate belt in which it lies." He further states that both hanging and foot-wall are slate, which is an error, as the hanging wall of the lode is serpentine. Becker gives the following minerals as characteristic of the lode: horn-silver, malachite, galena, tetrahedrite in a gangue containing iron oxide, pyrolusite, quartz and blende. The accompanying section taken from one of the mine maps shows the position of the ore-bodies in the lode, and also that this lode is at the contact of slate and serpentine, a fact not hitherto recognized, so far as I know. The serpentine was determined by the microscopic examination of a thin section of the rock.

There is a basalt flow capping the hill by the outcrop of the lode, but there is probably no connection between this eruption and the deposition of the ore. The vertical depth of the lowest working below the basalt cap is about 1,300 ft., and the ground in this lowest working is said to be moist; otherwise the mine is quite dry. The ores were in general pretty thoroughly oxidized.



VERTICAL SECTION OF NORTHERN BELLE MINE.

Kaolinized is changed into kaolin, or China clay. Kaolin is Chinese—*Kao Ling*—the name of a range of hills where this substance occurs plentifully.

[1] 'Geological Sketches of the Precious Metal Deposits,' Washington, 1885.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

A FRIENDLY CORRECTION.

The Editor:

Sir.—The interesting plan and description of the new plant of the Canadian Copper Company, published in the JOURNAL of December 31, 1903, and in the four-page advertisement of the Engineering Company of America in the JOURNAL of January 7, 1904, bear such a striking resemblance to the plant of the Tennessee Copper Company, that, while giving due credit to the Engineering Company for "special study and original research," it appears to the writer but just to give credit also to Mr. J. Parke Channing, who designed the Tennessee plant, that has been running successfully for over two years.

Regarding the difficulties in the smelting of copper-nickel ore mentioned by the Engineering Company, it may be stated that the plan outlined by them of smelting the ore in rectangular blast-furnaces and bessemerizing the resulting matte to 80 per cent in modern trough converters has been in successful operation for three years at a point less than 20 miles from Copper Cliff, in the plant of the Mond Nickel Company designed and managed by Mr. Hiram W. Hixon.

ONTARIO.

Sudbury, Ont., Jan. 7, 1904.

MINE SAMPLING.

The Editor:

Sir.—The suggestion of Mr. Forbes Rickard regarding special samples of group quarterings would be, at times, most useful to the engineer. The difficulty in following it seems to lie in the practical impossibility of taking samples strictly proportional to the width sampled. As a general thing, when a basis of sampling is adopted of so many pounds per foot of width of vein, that is taken as the minimum permissible and the sampler feels at liberty to exceed that amount so long as in any one sample he attains the prerequisite of equal weight from each foot or fraction of the width. It would appear, then, that if the whole of the rejected quarterings is taken from a group of samples and cut down to a single assay sample, the result is almost certain to contain serious errors. The first recourse would be to take proportionate amounts from the discarded portions of each sample, say, a pound to the foot, or what you will; but there we are met at once by the difficulty of cutting down a sample of rather coarse rock to an exact weight.

As an alternative and a safer method, I would suggest that the whole weight of the discarded portion of each sample be determined; that these discarded portions be then combined into the proper groups and cut down for an assay sample; then, in place of comparing this result with the true average value obtained by the foot-dollar method, compare it with the average obtained by what might be called by analogy the pound-dollar method; that is, multiply the value of each sample by the weight of the discarded portion and divide by the sum of the weights. Of course this merely acts as a check upon the 'cutting down' and assaying of the samples, and as a guard against tampering with them; the results meaning nothing in the valuation of the mine. But so far as that goes, this is all the method furnishes in any case.

I feel sure that no apology is needed for assisting to re-open a subject that has been so well threshed out before; it is indeed to be expected that the last word will not be said for a long time to come.

R. GILMAN BROWN.

San Francisco, Dec. 31, 1903.

A BUREAU OF MINING.

The Editor:

Sir.—Your article on 'A Bureau of Mining' refers to a matter of general interest. I hardly feel as though I had enough knowledge of the system and administration of the United States Geological Survey to offer any suggestions of particular value. Like most engineers, I have profited by the Survey's work a number of times. I have no suggestions to offer on how to make the reports and bulletins more serviceable, because I feel they are so good already that they are beyond my criticism.

The only part of the whole system that seems to call for criticism has nothing to do with the Survey itself, but possibly the Survey, or the Survey and the JOURNAL together, could do something to help matters. I refer to the fact that it is unnecessarily difficult to get the government reports at the places where one most needs them. Of course, I know that any engineer may accumulate a library of his own, if he has the money and patience, but engineers feel the need of the government reports most keenly when they are far from home, and the general public is composed of individuals who need the information so seldom that it does not pay them to own a reference library; yet the benefit that would accrue to the public as a whole, and to the engineers as a class, would be very great indeed, if only the government information was easier to get and digest. There ought to be a full set of the United States Geological Survey reports in every prominent mining center, and they should be so catalogued as to enable a man to pursue any given line of investigation with the least possible trouble. The public libraries throughout the West have all the latest novels and literary trash, but very few of the United States Geological Survey works. In this they are simply following popular demand; but it seems to me that public institutions should take a step in advance of popular demand to the extent of offering every facility for the reading and study of those publications which are prepared at public expense.

I understand that Mr. Andrew Carnegie has established a very large number of public libraries, and I have no doubt that if Mr. Carnegie should express such a wish, each and every library which he has established would feel itself bound to make a special point of government literature. Mr. Carnegie is one of our greatest engineers, and it does not seem at all unlikely that his interest could be aroused to the extent of bringing about the plan which is suggested above. Having got all the Carnegie libraries into line, it is most probable that many others would follow suit, especially if a little pressure is brought to bear on the matter through the press. In regard to cataloguing, it has always been my personal experience that, what with the indifference of the average librarian to this class of literature and the manner in which the United States Geological catalogue is compiled, it is a difficult matter to dig out all the information on a particular subject. Take, for instance, the cyanide process. I have before me the catalogue and index of the United States Geological Survey from 1901 to 1903. I find nothing under the head of 'Cyanide,' and yet I see on page 32 that 32 bulletins have been issued on the subject of 'Chemistry and Physics.' It does not seem probable that such an important matter as the cyanide process has been entirely overlooked, but I find no way of ascertaining what all these 32 bulletins are about, except to call for all of them and read them.

I do not offer the above remarks as a criticism of the system followed by the catalogues of the Survey. I feel quite sure the difficulty lies in my own ignorance of the system, but I mention this instance to show that it is difficult for the average layman to get at what he wants, and either the local librarians should be induced to learn the government system of cataloguing or some simple "key" should be published for the use of the average layman.

In regard to co-operation between mining men and the Survey, I cannot think of anything better than the continuance of the cordial relations that already exist. It has been my observation that local mining men are nearly always hospitable and ready to help the geologists, and the geologists are always ready to lend their knowledge to help unravel the problems confronting the miner.

By the way, when the miner is so extremely good natured as to go down in his pocket for $7,000 to help out the Survey appropriation, as the Cripple Creek miners did, it strikes me that the Survey ought to give more attention to the Cripple Creek work than it has done thus far.

GEO. J. BANCROFT.

Denver, Jan. 20, 1904.

The Editor:

Sir.—The history of the Geological Survey is most remarkable and very, very creditable to the honorable gentlemen who have distinguished themselves in its administration. Too few are well informed as to the obstacles which have been met and overcome in accomplishing the great work performed in the quarter-century of its existence as an independent institution. The compromises under which several somewhat competitive bureaus were consolidated about 25 years ago; the exotic influences which have, from time to time, thwarted its officers in well-designed plans for effective work; temptations to falter in maintenance of the highest standards; efforts to use the organization to serve political ends; opposition of those who have been disappointed in efforts to use the Survey for personal gains; appropriations many times inadequate; captious criticism from influential but incompetent sources; ill-advised legislation clogging progress, these and many other drawbacks have become known to outside observers like myself in the fruitful years for which so much is due to King, Powell and Walcott, as chiefs.

It is much to have kept alive a complicated organization like this for so long, more for it to thrive uninterruptedly with only three successive heads in all that time, but most of all not to have merited or received aught but the

strong support, unswerving confidence and self-sacrificing industry of all the great American geologists who honored the nation by serving in its employ.

I take it this introduction may be sufficiently convincing of my own belief in the trustworthiness and general efficiency of the Survey, not to permit of any misconstruction of what is to follow herein.

It must be apparent that the present great extension of the scope of the Survey was not contemplated by its early promoters. It has grown, not spontaneously nor improperly, but, of necessity, asymmetrically. To some of its best friends, it appears to have need of revision in some particulars, which presumably cannot be accomplished wholly from within; else probably this letter would now be without *motif rational.*

In this place, the only appropriate discussion is confined to the engineering aspects of the proposition; hence I do not touch upon the items of forestry and hydrography. The building of dams for water storage and distribution may become of importance to our profession in many ways; for there are inalienable rights to natural power and to water for mining purposes, as well as to water on the lands and the right to cultivate.

Dams built without intimate knowledge of the local geologic structure may share the fate of the Austin (Texas) works, and there is much danger of similar failures in two or three selected government sites, unless the utmost care be exercised in location and construction. So the water power utilized by the nation cannot safely and surely be conserved without close attention to geologic conditions. To this extent, the segregation of such engineering work in a division of the Geological Survey is indefensible; but no more so, nay, much less so, than the placing of the construction of debris dams under the same authority.

The Mining division has not been neglected under Walcott, I believe, more than has been actually necessary under the peculiar conditions. But the results cannot well be commensurate with the requirements, without such changes in the organization of the Survey as will give more significance to this department. This branch is now of less relative rank than the division of Forestry and that of Topography or Hydrography.

That it has become efficient to its practical limit under the circumstances is due to the personnel of its able staff. There are monographs of great value covering isolated tracts, but their weakness lies in their disconnection from the general areal geology. To the mining engineer, whose practice demands this most important knowledge, this feature is disappointing. Would it not be remedied by placing this department on a broader basis and by preparing field workers with better notions of regional geology before making local studies underground? The lack of this precaution is undoubtedly one reason for the common complaint of the delay in publishing mining reports.

However local a mining problem may be, it is never disconnected from regional geology, even as a business enterprise. However much the regional geology may assist in interpreting local phenomena, there is always some individual problem to solve at each mine. But it is usually a knowledge of the former which will prove most valuable to the miner in a new district. Analytic economic geology is completed, ready for publication, when the mines are exhausted, because the data for its study came out of the developed mines. Synthetic economic geology properly precedes mine development, for it reasons from the known to the unknown and furnishes rules for guidance of miners in development.

There has been some agitation in favor of utilizing the Geological Survey as a Bureau of Mines, in the popular sense; that is, as a place where specimens may be assayed free, or at cost. There is far more reason for the National government to embark in the business of furnishing bread and clothing to the multitude. If such a bureau can be justified on any grounds, there is no reason whatever for burdening the Geological Survey with it. Nor does it seem reasonable to tax this overweighted organization with the collection of statistics of production or the study of metallurgic industry.

There is crying need of a real active bureau of Mines and Mining, with sufficient prestige of its own to enable it to procure statistics and analyze them; to take cognizance of the progress in mining, ore-dressing and metallurgy, and to otherwise act for the welfare of the mining industry, man and man alike. These duties are extraneous to the Geological Survey; the due performance of them must necessarily hamper its other work, unduly absorb its revenue and complicate its organization. A separate, live, well-endowed and properly manned bureau in the Department of Commerce would most satisfactorily meet the needs of the whole mining fraternity, besides removing an excrescence from the Survey.

It need hardly be added that these are my own candid opinions, given without any opportunity to know the views of any member of the Geological Survey upon this subject.

THEO. B. COMSTOCK.

Los Angeles, Cal., Jan. 15, 1904.

OIL FOR CONCENTRATION OF ORES.

The Editor:

Sir.—In your issue of November 28 you publish a letter on the subject of some specially prepared oils and special application of the same in the concentration of ores. In case that letter should lead some readers into a misapprehension of the usual conditions affecting oil concentration, I venture to submit the following notes:

In an article on the subject which I wrote, and you published in your issues of February 14 and 21 last, a description is given of the kind of oil used, and it is desirable, in the interests of the process, that there should be no mystery on the subject. Experiments and working tests, as well as actual working results, have shown that the ordinary cheap American residuum (which can be purchased in the open market) is the most effective material on every variety of ore which is susceptible of treatment by oil; and that on certain minerals its effectiveness is greatly increased by a very slight acidity of the water used, or in some cases by the very small addition of any acids soluble in, or capable of mixing with, the oil itself. This discovery of the effect of acidity is the subject of a separate patent in connection with the concentration by oil. I do not know what the "aluminated hydro-carbon oil" mentioned by your correspondent may be; but if it be of acid reaction (implied in the words "acidulated aluminum salts"), it is a re-discovery of what has been already described; and if it be not, its value will rest on its being supplied at a cheaper rate than ordinary residuum to users of the latter, and it will be of consequent advantage to the process. The writer, however, states that the "aluminated" oil requires for its preparation quite an outlay for special machinery and special chemical skill. From which it would appear improbable that it will undersell the cheap by-product of the ordinary refinery, which is perfectly satisfactory in actual practice, within all variations of temperature of flowing water, under working conditions.

Your correspondent refers to many unsatisfactory results in oil concentration having resulted from the impression that it was necessary to stir, mix, or agitate the pulp and oil: and then proceeds to describe another method of insuring contact between the mineral particles and oil. It may be well to mention that the whole success of any oil process must depend on securing this contact. The basis of the Elmore process consists in the use of a flowing pulp, and the use of any quality of oil which has the necessary selective action on contact. The improvement described by your correspondent is essentially spraying the pulp through a floating body of oil; which method is referred to in my former article as having been one of many tried and abandoned in developing the Elmore process. Every mining man knows how much time and money have been wasted in the inventing, patenting, and testing of the recurring idea that quicksilver could be sprayed through ore, or pulp sprayed through quicksilver, in order to get contact for insuring amalgamation. It is not possible on a large working scale to get contact of all the particles of mineral by spraying a pulp on to a body of oil; and, even if partially successful on some easily treated ores, it is in effect nothing but a modified and limited agitation. Your correspondent describes two experiments with glass cylinders, by which he proves that a stream of pulp poured through a layer of oil yields to the latter very little of its mineral, but that, if the pulp is poured in while the oil is rotated (that is, agitated), a good extraction of mineral will be effected. From this he is led to propose a modification of the oil process, which has been already proved a practical success, and by which improvement "the mixing or agitation of the oil and pulp is entirely eliminated" by "the centrifugal action of the body of rotating oil in the spitzkasten." It is very far from clear how a process which depends on contact of the finest mineral particles and oil is brought about by a centrifugal action, which is in no way an agitation. If it be contended that centrifugal force has play in separating the mineral from the rock in a pulp, then the efficiency of separation depends on things other than the selective action of oil, and no practical man will depend on any successful results from the extremely limited centrifugal force of a body of oil rotating on water; and, furthermore, centrifugal force for concentration purposes on an unsized pulp is no longer believed in. But, as the argument of the writer appears to rest on a peculiar property of the surface of a body of oil not possessed by its interior, there would seem to be no special efficacy in a centrifugal motion beyond its use as one method of agitating pulp and oil together to increase the chances of surface contact. This discovery of the increased selective action of the surface of an oil body perhaps arises from the fact that to get a particle of mineral into a body of oil it

is necessary to pass the surface before getting into the interior. To increase the chance of surface contact, a certain amount of breaking up of the oil or pulp is resorted to in practice by some means of agitation.

It seems a trifle early to be discussing improvements in a process as yet so little known practically; but to show that, even with ordinary cheap oil and agitation, good commercial results are obtained, I give the following figures from a 10-stamp mill which has been in operation in Cornwall for some months. The material treated is quartz containing iron and copper pyrite and is the old waste of an abandoned copper mine. It is stamped, run over Wilfley tables, and then through the oil process, the whole automatically:

	Copper, per cent.
3,040 tons (2,240 lb.) assayed	0.95
Wilfley concentrates assayed	7.57
Wilfley tails assayed	0.72
Oil concentrates from Wilfley tailings assayed	7.77
Tailings from oil process assayed	0.20

It is evident that there can be little, if any, profit in treating such a grade of ore on such a scale of working; but that has no bearing on the success of the process, except as indicating that cost of operating must be low for it to have continued so long.

The results from another mill of 20 stamps, erected in Wales, for treating a body of slate with iron and copper pyrite, which turned out to be extremely low grade on the average, were as follows:

	Copper, per cent.
3,991 tons of ore assayed	0.67
Wilfley concentrates assayed	3.26
Oil concentrates from Wilfley tailings assayed	6.51
Tailings after oil process assayed	0.21

Of the total extraction of copper the Wilfley concentrates accounted for 39.1 per cent, and the oil process extracted 60.9 per cent. The large percentage of iron pyrite present prevented the concentrates running higher in copper.

Mr. Prentiss, of 53 Crocker Buildings, San Francisco, is now prepared to make experiments on samples to determine if suitable for oil concentration.

WALTER MCDERMOTT.

London, Jan. 1, 1904.

SOME ASPECTS OF MINING FINANCE.

The Editor:

Sir.—The interesting article in your issue of December 5 entitled 'Some Aspects of Mining Finance,' devotes much attention to the operations of the Exploration Company, Ltd., and incidentally places the management in what seems, to the writer, an unfair light. Furthermore, the moral drawn is not the one that the writer would draw from the ill-fortunes of that eminent corporation.

When the Exploration Company increased its capital to £1,250,000 sterling, the problem which faced the management was how to earn a decent dividend on that enormous capital, and at the same time to control the operations of the company from one central office. Many mining men of the highest standing were either directly employed to pick up business or they were assured that any propositions made by them would be seriously considered and investigated. Furthermore the general mining public was not slow to realize that no ceremonious introductions were necessary to bring business before the Exploration Company, and for many months propositions from every corner of the earth were submitted, each one receiving due attention. Many mining properties were inspected by eminent engineers and a few were taken up, financed and set going.

It soon became apparent, however, that the immediate profits from mining alone were not going to suffice for the payment of the necessary dividend and the management was forced to look elsewhere for something "quicker." Considerable share dealing followed and a good deal of money was loaned on the "carry over."

Industrials soon attracted the attention of the management, and, without turning aside in the least from mining, they invested money in several very satisfactory undertakings, as, for instance, the Central London Railway and the Metropolitan Traction. Perhaps it was their success with these that led up to the disastrous investments in Paris tramways.

The Exploration Company never did any actual mining in South Africa, presumably because of the ample capital already available for work in that country; but its activity in the United States, Mexico and Australia was considerable.

Its early American business included the Oneida mine in California, the Steeple Rock Development Company in New Mexico, the Grand Central mine in Sonora, Mexico, the Helena & Frisco mine in the Cœur d'Alene and the Tomboy mine in Colorado. In taking up these different properties, the greatest caution was observed in providing for thorough investigation on the part of recognized experts; but, notwithstanding the great promise of these undertakings, none of them can be called brilliant successes, and some of them have been distinct failures.

In Australia, the Exploration Company connected itself with Messrs. Gibbs, Bright & Co., and they jointly employed a staff of engineers, at whose head was Mr. E. J. Dunn, the eminent mining geologist, and a large amount of business was engaged in without a single success.

In Western Australia, several of the best mines of the early days were acquired in conjunction with some Paris friends of the Exploration Company and under the management of Mr. R. M. Raymond (now at El Oro, Mexico), a determined fight was made to place these properties on a profit-earning basis. Any one of these mines would have been good business in an average American camp, but the high working-costs, incidental to Western Australia, eventually swamped them. The Exploration Company, however, did pretty well in speculation with Kalgoorlie shares under Mr. Raymond's guidance.

The activity of the management of the Exploration Company during this period was amazing. With ample funds at their disposal, they left no stone unturned to find good mining business. They were aided by the best technical advice obtainable, and spared no expense in carrying out investigations.

In spite of this, they were unable to find sufficient profitable business to pay 20 per cent dividends on $6,250,000, which was the original ideal of the undertaking.

The Exploration Company's friends believed that its huge capital, aided by the best technical advice obtainable, would enable it to "average up" its mining investments to a highly profitable degree. The very weight of its capital dragged it down and the extent of its operations made personal supervision over its advisers impossible.

The shareholders of such a company are not content with the ordinary rates of interest. The owners of mining property invariably regard an exploration company, with a large capital, in the light of a heaven-sent help. The maintenance of high-class technical staffs in various parts of the world is a very expensive undertaking.

The opposite policy in founding exploration companies is to provide only sufficient capital to send a good man to a likely district, and keep him there for a few months; when attractive business presents itself he is not handicapped in his negotiations by being known as "the Exploration Company's representative." Let him call upon his backers for the capital to operate with; but, until then, their money is better off safely tied up in United States bonds, drawing an uninteresting interest. If no attractive business is found, the man in question is not being continually pestered to make some money, somehow, "because our annual meeting is drawing near," and perhaps worried into taking hold of something he is not quite sure of.

RICHARD M. ATWATER, JR.

Ymir, B. C., Dec. 31, 1903.

SECONDARY ENRICHMENT IN THE SANTA RITA DISTRICT.

The Editor:

Sir.—The recent discussion in the ENGINEERING AND MINING JOURNAL concerning secondary enrichment has proved extremely interesting. Such a discussion is of profit to the mining world for several reasons. In the first place, it is of prime importance to understand not only the character of ore-bodies in a given district, but also to determine their origin, their continuity, as well as their several alterations. Occasionally it is possible to trace these features from a study of the unaltered country rock in which the veins occur, or from the vein itself at different depths, while sometimes segregation of the ore in the gangue matter can be traced to infiltration from below. Every mining camp has an individuality of its own; broadly speaking, no two are exactly alike in the minerals they possess and in the geological relation of the ores to the surrounding country rock. The 'pay ore' in any locality may be limited to some single mineral species, as, for example, free gold in quartz, but more frequently several ores occur together like the carbonates of copper, azurite and malachite. If there is one subject which has been overlooked in the study of ore-deposits, it is that of association of minerals in their genetic relationships; this grouping of minerals in various localities depends both upon the chemical elements present during the time of solidification or of secondary infiltration and also upon the peculiar physical conditions in force when these minerals were forming. For example, the crystallization of minerals in one of six systems may take place according to a number of different habits, as in calcite, where crystals are either scalenohedral, rhombohedral, tabular or prismatic. Again, the presence of some chemical substance may effect this result and cause the mineral to assume a different habit from its usual one. Halite (common salt), for instance, which usually crystallizes in cubes, can be made to solidify in octahedrons when crystallized from a solution containing sodium hydroxide.

In a recent visit to the Santa Rita copper mines the writer was particularly impressed with the enormous amount of native copper which these mines are now shipping and the limited amount of the other copper minerals associated with it. The native copper is unquestionably a result of secondary deposition, the copper being derived chiefly from sulphides, but also near the surface, from oxides; and perhaps, though to a much less degree, from some carbonate ores near the overlying limestone beds. The carbonate ores, azurite and malachite, so frequent in limestone regions impregnated with copper, are here strikingly rare, although in some of the dumps near the limestone outcrop, malachite is present in small amounts. Next to native copper, cuprite is most abundant, occurring as an incrustation upon the sheets of native copper. Chalcotrichite (capillary cuprite) is now hard to get, and the more common form is a brick-red earthy filling in the seams and fissures of the felsite.

Native copper is the characteristic ore of the Santa Rita mines, and it would be difficult to find in any locality better examples of this mineral. Sheets measuring more than a foot across are common, and occasionally they measure several feet in diameter, and are of considerable thickness. This native copper is, without doubt, a result of secondary enrichment, as is much of the chalcocite on the east side of the Morenci district, at the Shannon mine, with which the writer is familiar. In the latter mine three distinct types of copper ores occur: first, the carbonates; second, the sulphide, chalcopyrite, in the center and in the *unaltered* felsite porphyry; and, third, the sulphide chalcocite, in the *altered* partly decomposed felsite on the east side of the mountain. One cannot break a piece of this porphyry open without finding small black spots abundantly distributed through the rock-mass. In this case the chalcocite is secondary, and has been derived from cupriferous pyrite, chiefly low-grade chalcopyrite, which to-day still exists in unaltered condition near the center of the felsite porphyry forming the core of the mountain. So also at Santa Rita, the native copper has, through innumerable fissures and seams, been dissolved out by percolating solutions rich in copper, which, penetrating the felsite rock and reaching the point of saturation along the fissures and seams, was deposited in the form of native copper and, near the surface, as copper oxide.

Fresh surfaces of the felsite porphyry reveal the chalcocite, and it is from this mineral and presumably from chalcopyrite deeper in the rock magma that the copper is derived. This copper is not confined to narrow veins or seams, but penetrates, like a network, into the felsite wherever fracturing has taken place. Where this segregation has been most centralized the largest ore-bodies exist. The waters which have made this possible, presumably came largely from the surface, infiltrating downward both by capillarity and percolation. Lateral secretion must have been prominent, but it is not likely that any material was introduced by sublimation or ascension from great depth. There is, I think, fully enough copper in the sulphide form present in the original felsite to furnish all the copper mined in this region. It has undoubtedly segregated through several hundred feet of rock and has been carried along for considerable distances in the dike magma.

Just east of the Santa Rita mines rise rugged outcropping dikes of a porphyry which, in some phases, resembles the unique "bird's-eye porphyry." These dikes are interesting for the large number of feldspar phenocrysts they contain; they appear in various places northwest of Santa Rita, and cut the Carboniferous limestones which form the surrounding hills. Occasionally the ferro-magnesian minerals predominate, but more generally the rock is light in color, like the typical acid series. The darker types presumably carry much magnetite and this, together with the copper-iron sulphides, have given rise to the magnetite and hematite ores now being largely worked in this region by the Colorado Fuel & Iron Company.

RUFUS M. BAGG.

Socorro, N. M., Jan. 13, 1904.

MINING AND MILLING IN THE MOJAVE DESERT.

The Editor:

Sir.—The Desert region, from an economic standpoint, in regard to mining, has a number of disadvantages that militate against the profitable extraction and reduction of low-grade ore, as compared with more favored localities. The scarcity of water, fuel and timber, and, in some cases, an entire absence of the same, increases the cost of mining and reduction to such an extent as to render the mining and reduction of low-grade ores unremunerative. The last-named conditions obtain at Randsburg, Kern county, California. In the accompanying table from the monthly report of the Yellow Aster Mining & Milling Company it will be seen that low-grade ore, from $3.50 up, can be made to yield a good profit, under proper conditions. The above-mentioned mine is equipped with two mills, one of 100 and the other of 30 stamps, reducing 500 tons of ore a day on an average. Although within a distance of two miles of the terminus of the railway, freights are high, as will be seen from the prices of supplies, a few of the important ones being appended.

Fuel oil, 4½c. per gal.; lumber, $32.50 per thousand; other supplies in proportion. Water is obtained from two wells, sunk to the depth of 450 and 300 ft., respectively, at a mean distance of six miles from mine and mill, at a point 1,500 ft. below point of delivery. On account of the strike declared against the company on June 10, 1903, the mine remained closed until September 1 following. Since that date the mine has been in operation steadily to its full capacity, with non-union employees.

The following is the scale of wages: Miners, 9 hours, $3; muckers, 9 hours, $2.50; car-men, 9 hours, $3; timber-men, 9 hours, $3.50; amalgamators, 12 hours, $4; stationary engineers, 12 hours, $4; hoisting engineers, 8 hours, $3.50; pump-men, 12 hours, $3.50.

EUGENE H. BARTON.

Randsburg, Cal., Dec. 15, 193.

Yellow Aster Mine.
14,601 Tons Treated.

		Total expenditure.	Expenditure.	Per ton.	Remarks.
Ore extraction		$17,656.40			
	Labor		$10,696.69	$0.73260	Miners, muckers and carmen.
	Timbering		803.55	0.05500	Timbermen, framers and assistants.
	Timber		2,661.47	0.18228	8 by 8, 6 by 8, 2 by 12; Oregon pine.
	Powder		580.68	0.03977	
	Fuse		93.90	0.00643	
	Caps		44.97	0.00308	
	Lights		306.62	0.02100	Candles, electric and oil.
	Blacksmithing		498.32	0.03414	Tool-dressing, horseshoeing, car repairs, etc.
	Development		628.72	0.04306	Hoisting, training and incidentals.
	Haulage		643.90	0.04410	Drivers, mules, feed, etc.
	Hoisting		697.92	0.04780	Tons hoisted, 6,900; cost per ton, $0.1012.
			$17,656.40	$1.16620	
Milling		$5,981.69			
	Power		3,340.70	0.22880	Attendance, fuel and maintenance, etc.
	Labor		1,123.40	0.07694	Amalgamators, foreman, etc.
	Rock-breaker		674.67	0.04620	Attendance, repairs, etc.
	Shoe and dies		535.79	0.03690	
	Repairs		256.53	0.01757	General repairs.
	Mercury		47.60	0.00326	0.0815 oz. loss per ton.
			$5,981.69	$0.40967	
Water		$3,220.09	3,220.09	0.22053	Pumped 6½ miles against 700 lb. pressure, at a cost of 19c. per 1,000 gal.
			$3,220.09	$0.22053	
General expenses.		$3,325.83			
	Miscellaneous		1,460.10	0.10000	Taxes, insurance, expressage, etc.
	Assaying		160.61	0.01100	Assayer, fluxes, fuel, etc.
	Salaries		950.87	0.06507	Superintendence, engineering, etc.
	Tailings		313.33	0.02146	Impounding tailings and water.
	Incidentals		440.92	0.03020	Telegraphing, legal and office expenses, etc.
		$30,183.96	$3,325.83	$0.22773	

From November 1 to December 1, 1903—
Total disbursements $30,183.96
Total cost per ton 2,067

THE JOPLIN DISTRICT.

The Editor:

Sir.—Your correspondent, 'Zinc Miner,' whose communication you print in your issue of January 21, is quite in error in assuming that I have an aversion to the Joplin district, which I should regret as much as he and his friends, if it were so. The only possible basis for this idea is my expression of opinion that the exportation of ore from the district at a loss, and the restriction of production under the conditions which exist, are in the line of a mistaken policy. I applaud the efforts of the miners to sell as dearly as possible, just as I do those of the smelters to buy as cheaply as possible, because both are natural in the exercise of business, but I deprecate effort which seems to me prejudicial to the interests of both parties. If we have got to export zinc I would rather see it go out as spelter than as ore, and let Americans have the work and profit in smelting it.

W. R. INGALLS.

Boston, Mass., Jan. 25, 1904.

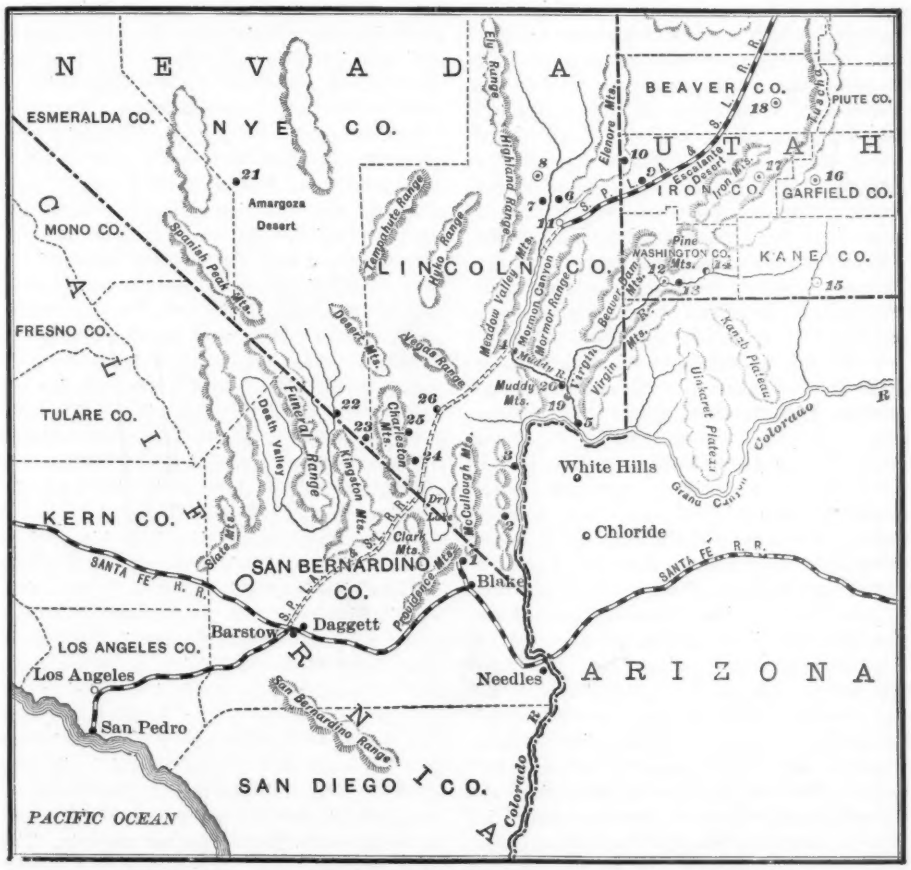
ATMOSPHERIC ACTION ON ZINC.—G. T. Moody exposed strips of thin sheet zinc to the atmosphere for five months and then detached the semi-crystalline scale that had formed. This was found to be of the composition closely approximating the formula $ZnCO_3$, $3Zn(OH)_2$. The production of this basic carbonate is regarded as evidence that the atmospheric corrosion of zinc is due not to direct oxidation of the metal, but to an interaction with carbonic acid. The attack on the zinc is checked because the acid is retained in combination as basic carbonate.

THE OUTLOOK FOR MINING IN THE NEW TERRITORY OPENED UP BY THE SAN PEDRO, LOS ANGELES & SALT LAKE RAILROAD.—II.

By M. S. Duffield.

(*Continued from page* 116.)

After leaving Kalientes, in Lincoln county, Nevada, the country becomes an arid region of the worst kind. The road-bed is already graded some 40 miles below Kalientes. When the building of the railroad through to Los Angeles was contemplated, the Meadow Valley wash, which affords the only practicable gradient from the high Utah plateau to the desert regions of western California, became the all-important route. In order to hold this right-of-way hurried grading was done at various strategic points in the cañon by both Senator Clark's company and the Oregon Short Line. Here occurred the final deadlock as to who should own the through line. The settlement of this question through the purchase of the Oregon Short Line's interest by the San Pedro, Los Angeles & Salt Lake Railroad gave an impetus to the further building of the railroad, which is to be completed in 1905.



SKETCH MAP, SAN PEDRO, LOS ANGELES & SALT LAKE RAILROAD.

TOWNS AND CAMPS.

1. Manvel.
2. Searchlight.
3. Eldorado Cañon.
4. Moapa.
5. Rioville.
6. Panaca.
7. Bullionville.
8. Pioche.
9. Modena.
10. Stateline.
11. Kalientes.
12. St. George.
13. Washington.
14. Silver Reef.
15. Kanab.
16. Pangvitch.
17. Parowan.
18. Beaver.
19. St. Thomas.
20. Overton.
21. Tonopah.
22. Resting Springs.
23. Sandy.
24. Good Springs.
25. Cottonwood Springs.
26. Los Vegas.

The Meadow Valley wash is the first long dry river-bed that is encountered along the southern edge of the Great Basin. The word 'wash' is unknown in those parts of Oregon and Idaho lying within the great plateau, and in northern Utah and Nevada; but in Lincoln county, Nevada, and in Washington county, Utah, the term is heard everywhere. These 'washes' are the infallible sign of the breaking down of the basin plateau; they are the channels through which the great inland sea was drained, when the Great Basin was gradually elevated. Their direction in general is toward the Colorado river, or the sink of the Amargosa and Death valley. The valleys lying between the north and south ranges undoubtedly acted as the first outlets, thus forming vast gravel-beds; and what are to-day particularly described as washes are the later and more torrential channels. The Meadow Valley range on the west and the Mormon range on the east represent a gradual drawing together of approximately parallel ridges. Thus the slight moisture which the climate affords is confined, and the result is that at intervals, where the deposits of gravel are not too thick, there is running water. From Kalientes to Bamberger, where the new power-plant for the De La Mar mines has been installed, there is a perennial supply of water. Not far below Bamberger the water disappears entirely, only reappearing at three places the entire length of the wash, and then affording scarcely enough to support a small ranch at each place.

The valley itself is narrow, often a box-cañon with high lava bluffs; but occasionally it widens out into small basins flanked by rolling gravel foot-hills. On either side, above the lower trap rocks, are two high mountain ranges, the Meadow Valley and the Mormon mountains.

Except for some desultory reconnoitering by miners from De La Mar, in the Highland and Meadow Valley mountains, these ranges are practically unprospected. Along the route of the old wagon-road from St. George and the Virgin settlements to Pioche, whither the Mormons were wont to haul fruit and provisions to the miners, one small camp—the Viola district, as it was called—was started near Kiernan. A small stamp-mill was erected down in the main wash, to concentrate the high-grade sulphides. The veins occur along the contacts of different limestones, and the filling is quartz, through which are disseminated small stringers of silver sulphides (pyrargyrite), copper pyrite and occasionally some gray copper. They were proved unprofitable in the early days, affording only occasional shipments; but the best claims of the district have been held by re-location down to the present day, little or no development work being done. The properties will be easily accessible, but the present owners have, as is so often the case, fixed exorbitant figures on their value now that the railroad is nearing completion.

In these ranges—the Mormon and Meadow Valley mountains—there are, aside from the Viola district, neither prospects nor prospectors. Scarcity of water is the great handicap. In summer the heat is excessive. In the spring the prospector can rely on finding some pockets of water in the high cañons, but the season for this is short. The country is so rough and precipitous that packing water is laborious, when not impracticable. The main axes of these ranges are Cambrian quartzites and Carboniferous limestones. Igneous dikes are of frequent occurrence. Were it not for the lack of water, the region would attract prospectors.

Emerging from the Meadow Valley wash the railroad will cross the Muddy river flats and will bear westerly with an easy gradient to the Vegas valley. From Moapa, the Indian reservation near the crossing of the Muddy, a valley route can be found to the Virgin river, and thence north to all the Mormon settlements of St. Thomas, Overton, Bunkerville, St. George, Toquerville and Panguitch. East of Moapa and in the Virgin range, is the Key West mine, where development work is being done on copper deposits similar in character to those of the Dixie mine. In the same region different Mormon farmers have done assessment work on promising gossan outcrops. South of the Key West, in what is called Cedar Basin, are some prospectors who are working on gold-bearing sulphides; but the major portion of the Muddy range and of the country east of the Virgin river, known as No Man's Land, is practically unknown.

Not far from the junction of the Muddy and the Virgin rivers are the salt bluffs for which the Virgin river has long been famous among the Mormons. But little attention was ever paid to these deposits by outsiders or Gentiles. The Mormons have worked them enough to get salt for their cattle. The deposit is in a hard rock form, enclosing occasionally crystals of selenite (hydrated calcium phosphate). The salt bluffs stretch, under a cover of soil, for two miles in length; they are 1½ miles wide, rising several hundred feet above the valley; their depth is not known. It would seem that they are related geologically to the salt field in the Silver Peak district of Esmeralda county, Nevada. The supply is unlimited, but the future of these Virgin river beds will depend on conditions which it is difficult to forecast. It will certainly be most accessible from Moapa and the Mormon settlements.

From Moapa to Los Vegas ranch, a distance

of 55 miles, there is a waterless waste, except for one small 80-ft. well, which was put down last summer on the margin of a dry lake. North of the surveyed route the Sheep mountains and the Vegas range have never been prospected. One cañon of the Sheep mountains afforded the first Mormon settlers a scanty supply of timber, which they hauled 50 miles, or even more, to the settlements on the Virgin river. About Moapa there are a few shiftless Indians. Occasionally a prospector passes up the Meadow Valley wash, bound north for the big Utah camps, or comes up from the desert regions of the southwest to the Mormon settlements to rest and "feed up"; but the district is usually given a wide berth, because of the lack of water. Several cañons in the Sheep mountains exhibit snow as late as April, and the country will eventually have its share of exploration. There are rumors of lead having been found in the western extremity of the Vegas mountains, but no claims have as yet been recorded. This is the region in which is supposed to be the Grundy, the lost mine of Mormon tradition. It seems probable that the Grundy mine has already been found in the rich galena deposits of the Spring mountains, which will be referred to later.

South of the route between Moapa and the Vegas valley are the Muddy mountains, and a broken, igneous landscape, through which stretch long dry washes to the Colorado river. Except for an occasional Indian passing over the Vegas wash, from the Vegas ranch to the Colorado river, the country is absolutely unprospected. There are not even any cattle in the hills.

The Vegas and Muddy ranges show the southernmost areas of quarzites and associated limestones of the Great Basin. West of the Virgin river these areas extend somewhat further south than in southwestern Utah; doubtless they are related structurally to the great curve of the Colorado river.

The Vegas valley, which is about midway between Los Angeles and Salt Lake, will doubtless be the site of machine-shops. It is the first available place after leaving Nephi, in Utah, and no suitable point occurs in western California. The valley is supplied with three springs, the largest affording about 240 miner's inches. The climate is all that could be desired, and there are some fertile meadows. The water is all owned by the railroad to-day. Northwest of the Vegas valley are two old, abandoned, free-milling camps, Montgomery and Sterling. The veins are mostly quartz with some calcite filling and yield good value in places, but the irregularity of the ore-bodies made it impossible to keep ore blocked out ahead of the mills. These camps are in the igneous foot-hills north of Charleston Peak.

The Spring mountain range, which lies west of the Vegas valley and culminates its northern extremity in the mountain mass known as Charleston Peak, is an excellent example of block-tilting on a grand scale. One striking feature is that the strata are tilted 30° west, a reversal of the usual tilting in the Great Basin ranges.

At the southern end of the range there are about 1,500 ft. of Carboniferous limestones; overlying these come about 1,300 ft. of red sandstones, supposedly Devonian; above them graywacke and limestones again for 2,000 ft. The eastern side of this range presents a precipitous face; this is especially true of the red sandstone and limestone areas about Cottonwood Springs and the base of Charleston Peak. At Cottonwood Springs the bluffs of red and gray sandstone rise perpendicularly for 1,500 ft. in a formidable mountain mass. This Spring mountain range for about 20 miles, in the neighborhood of the springs, has been lately fairly well prospected. Springs are of frequent occurrence high up in the red and gray sandstones, and also along the bluffs, on the line of a stratum of iron-stained cement; this stratum is composed of fine unwashed fragments of quartz held together by ferruginous silicates, and they warrant close inspection by prospectors. Small values in gold are reported from different places in this formation.

Charleston Peak itself affords as yet no mineral, but south, along the main axis of the range, there are frequent exposures of copper ore; these are in the region of the contact between gray sandstones and overlying limestone. It is doubtful if the veins are true fissures, as there are so many areas of brecciation near by that it seems more probable that they are disruptions along the shear-zones at different stages in the same rock system; for instance, the Ninety-Nine mine near Cottonwood Springs, which has been an occasional shipper, lies between a black and a dove-colored limestone. The vein here is wide and shows a strong outcrop; the ore-shoots are found along the foot-wall; in the brecciated filling both black and dove-colored limestone fragments are in great evidence. The shear-zone was originally impregnated with quartz; pressure and movement have fractured this, because the subsequent filling of calcite, which is seen in other ways to be a later deposit, has cemented together minute fragments of the quartz. The ores are mostly the black and red oxides of copper, together with chalcopyrite, all intimately associated with hematite. Throughout the oxidized mass occur nodules of malachite which, with the black oxide (melachonite), are sorted and shipped. Although these copper claims will be within four miles of the railroad, the irregular occurrence of the ore makes their future problematical.

In the Spring mountains, higher up than these copper deposits, is the old Mormon lead mine, the Potosi, which years ago furnished rich pockets of galena. This mine is now owned by Los Angeles people. Its future depends on the deposits of low-grade carbonates and milling sulphide ores that are exposed in the old stopes; however, there seems little doubt that more galena will be encountered with depth.

The Spring mountain district is very interesting geologically, being one of great brecciation. Different limestones and sandstones show immense shear-zones of cemented material. These layers, being impervious to water, have made numerous springs at intervals along the mountain; one of them, called Summit spring, is near the apex of the main range. There is evidence that the mountains were peopled long ago, mescal pits being of frequent occurrence. There are some hieroglyphics also in the red sandstone bluffs near Cottonwood Springs.

Charleston mountain has the only timber along the entire route from Utah to the Santa Fe Railroad; this is for the most part still owned by the government, although some of the cañons have been 'scripted' in the belief that they will strategically control much greater areas than those actually surveyed. The timber, which is mostly pine, is on the east and north slopes of the mountain; that on the west is limited. Southward there is, in the limestone areas, an abundant growth of cedar, juniper and piñon, but the high ground of Charleston Peak alone affords pine. There has been some discussion among the ranchers of Vegas valley as to petitioning the United States government to reserve this timber for the protection of their water-supply. The area is so small, about 18 miles square, and the timber will soon become so valuable that it seems doubtful whether any action will be taken; although in a region in which water is so precious, deforestation ought to be prevented.

South of Cottonwood Springs, in the same range, are the camps of Good Springs and Sandy; the former being on the east, the latter on the west slope of the Spring mountains. These two districts are in a fossiliferous limestone earlier than that about Cottonwood; they are probably lower Devonian. The copper lodes differ from those of Cottonwood in having more oxide and less sulphide ores, and scarcely any malachite. The veins are better defined, and the ore-bodies more permanent; but the values are not so high. Several mines, such as the Boss and the Columbia, have undergone considerable development. Some years ago the Hirsching ammonia process was tried at Good Springs, where a large mill and vats were erected; the product was to be a black oxide of copper. Failure was attributed to the character of the ore, but the mine-owners whose claims were leased attribute the failure to the process. Development work was unduly neglected, which accounts for the lack of ore, and it is no doubt possible that the ores contained more, and different, sulphides than had been anticipated. The present owner of the abandoned mill, who obtained possession by sheriff's sale, converted it into an ice plant and is selling his product in Searchlight and neighboring camps. Merit is still claimed for this ammonia process, but in this district it did not prove itself sufficiently adaptable to the changes in the ore.

Besides these copper claims there are some gold properties, the principal one being the Keystone, owned by a Los Angeles company. The ore occurs in a porphyry dike which cuts blue limestone and dolomite, and is in part intrusive between these rocks. The Keystone is remarkable for the occurrence of free gold in the talc seams that accompany the vein. The Green Monster mine, belonging to the Hearst estate, is also developing gold-silver-lead and copper ores along a similar contact of blue lime and dolomite. At Sandy there is a small Huntington mill.

(To be continued.)

CANDLES FOR SOUTH AFRICAN MINES.—Aside from the small local manufacture, candles used in South Africa are largely imported from Great Britain, Belgium and the United States. Price's candles, made in Great Britain, are perhaps the most popular, although at one time the Goodwin, of American manufacture, which is 20 per cent dearer, had a large sale. The Belgian candle is a strong competitor of the British, and, it is said, can be landed in South Africa at a lower price. Fourteen-ounce candles are in better request than the 16-oz., the standard size, the reason being that the well known 16-oz. "London sperm" burns longer than is required for one shift, and involves unnecessary waste.

THEORIES OF ORE DEPOSITION HISTORICALLY CONSIDERED.*

BY S. F. EMMONS.

(*Continued from page* 119.)

The scientific period may be said to have been entered upon near the close of the 18th century, when De Saussure (1779), Pallas (1777), and Werner (1791) almost simultaneously inaugurated, by their works, the era of positive geology. It was about the same time that chemistry was placed on a scientific basis by the researches of Lavoisier, Scheele, Priestly, Cavendish and others. Up to this time even the name geology had hardly been recognized, 'natural history' or 'mineralogy' being the titles usually given to works that treated of it, and the few exact facts with regard to it, which such men as Agricola, Steno and others had determined were drowned in a sea of conjecture. On the continent it was the mining schools that principally fostered mineralogical and geognostic studies, and these had been but recently founded; that at Freiberg, Saxony, in 1765; at Schemnitz, Hungary, in 1770; at St. Petersburg, in 1783, and at Paris in 1790. Geological literature, especially in Germany, went hand-in-hand with that on mining and mineralogy.

Of the three men just named, the two first were eminently observers. Pallas, after being called to the mining school at St. Petersburg, had made a six years' geological expedition through the mountains of Russia and Siberia, and De Saussure for over 30 years was largely busied in studying geological phenomena in his native Alps, being the first to climb Mt. Blanc and Monte Rosa. He also appears to have been the first to use the name 'geology' for his science. While neither of these men contributed much to the advancement of geological theory, they added largely to the store of ascertained fact, which is its necessary basis, and their greatest service perhaps was in inaugurating geological studies of the great mountain systems of the world, which more than any other branch of geological inquiry have been instrumental in raising this science to its present stand.

The actual field of observation covered by Werner, on the other hand, was extremely restricted, scarcely extending beyond the confines of his native Saxony. He had, however, a genius for the analysis, classification and coordination of observations, which enabled him to bring order out of the chaos of fact and fancy which then constituted the science. With an eminently didactic mind, he possessed with much personal charm such a power of impressing his ideas upon his pupils, that during the 40 years that he occupied the chair of mining and mineralogy, the Freiberg school was the center of geological studies in Europe. From it emerged so many distinguished geologists as the fruit of his teachings that, as Cuvier says: "from one end of the world to the other nature was interrogated in the name of Werner."

Contemporaneously with Werner an equally great service was being rendered to geology at Edinburgh, in Scotland, by James Hutton, who, like so many of the eminent geologists of the world, had been educated as a physician. Hutton, like Werner, taught mainly through his lectures, neither of them finding time for much writing, so that the doctrines of either have become known to posterity mainly through the publications of their pupils.

Each of these great teachers aimed to discard theory and to build their respective systems on a basis of ascertained facts, but in the then existing condition of geological investigation certain fundamental conceptions had to be assumed from the interpretation given to, as yet, imperfectly studied phenomena. With minds like theirs, strong in the courage of their convictions, an interpretation once fairly reasoned out and accepted became an established fact, and thus it came about that through a difference in their premises their respective systems were diametrically opposed, and gave rise to the great controversy between 'Neptunists' and 'Plutonists,' which, for nearly fifty years, divided the scientific world of Europe into two antagonistic schools. Werner assumed that the earth had once been surrounded by an ocean of water at least as deep as the mountains are high, and that from this ocean there were deposited by chemical precipitation the solid rocks which now form the dry land. He entirely ignored the internal heat of the globe, in its influence on crystalline rocks, on ore-deposits, and as a cause of the dislocations of stratified rocks. Hutton, on the other hand, while not ignoring the agency of water in the formation of the sedimentary rocks, ascribed to subterranean heat and to the expanding power it exercised, their final consolidation, their disturbed condition, and the changes produced in the older rocks—those changes to which Lyell later gave the name of 'metamorphism.'

Neither made any distinction between dikes and mineral veins, but while Hutton supposed fissures and openings to have been formed from time to time by rents which reached through the external crust down to the hot nucleus, and that both were formed by molten matter forced up through them toward the surface, Werner, on the other hand, taught that they were contraction-fissures which were filled by material held in suspension, or in solution, in the primeval ocean that once covered them, and hence must have been filled from above.

In general matters Hutton's reasoning and observations were both broader and more logical than Werner's and his views have hence proved more enduring, but he had little, if any, personal knowledge of ore deposits. Werner made their study an important feature of the geologist's training, and his principal publication was entitled, 'A new theory of vein formation.' Although this work was the only important one exclusively devoted to the subject, owing to the fatal defects in his geological premises, it contributed little to the permanent advancement of this branch of the science, and it may even be questioned whether it did not retard it, since through the great weight of the author's name it remained a standard work in Germany long after many of his peculiar geological theories had been discarded. Its merit lay less in the novelty of the views advanced, most of which had already been put forth by one or another of his predecessors, than in the logical way in which they were presented.

The principal points with regard to the origin of ore-deposits that may be considered as fairly well established by Werner's teachings are, first, that they are the filling of fissures and cracks of later formation than the enclosing rocks, and consist of foreign material subsequently introduced, largely in aqueous solution. As to the fissures themselves, while a certain systematic arrangement had been noted in their directions, and the fact that, where by intersection, one had been shifted or faulted by another, inferences as to their relative age might be drawn, no definite conclusion apparently was reached as to their origin, beyond the general suggestion that they might be the result of subsidence, or of contraction of the rock masses in which they occur.

Any important advance over these rather crude conceptions was hardly to be looked for until very decided progress had been made in the broad general theories of geology, and this progress was necessarily very slow. Although the period of reasoning from facts of nature to generalizations had commenced, the tendency to pure speculation was not yet extinct, and resulted in many remarkable theories, such as that put forth by Professor Oken, of Jena, who, in his text-book of Natural Philosophy (1809), assumed that the earth was a polyeder formed according to the laws of crystallization, and that veins or fissures resulted from the loss of the water of crystallization; for the genesis of ores, darkness, earthy water, and air are necessary; hence there can be no ore in the interior of the earth, since no air reaches, it., etc. Or again, that of Breislach, the Italian geologist (1811) who put forth a Plutonic earth theory which supposes that, while the rocks were still in a molten condition, the metals had a tendency to separate under the influence of specific gravity and of certain chemical and physical affinities, and localized themselves in veins without entirely separating from their country rock. This is apparently the first enunciation of the modern theory of magmatic segregation. The metallic grains in placers he supposed to have been granulated like slag on coming in contact with water.

The peculiar views of Werner naturally held sway longer in Germany than elsewhere, yet it was his favorite pupils that were first led, in their widening field of observation, to abandon his theory that basalt is of aqueous origin, though altered by the heat produced through the combustion of neighboring beds of coal.

Von Buch, for a long time the leading geologist of Germany, was perhaps the first to whom doubts came as to the correctness of his master's teachings, while studying an eruption of Vesuvius in 1799, though he refrained from immediate publication of these doubts.

D' Aubuisson, the French geologist, after visiting in 1804 the volcanic regions of Auvergue, also became convinced of its igneous origin and published a recantation of the views maintained in his essay of the year before on the aqueous origin of the basalts of Saxony. Finally, von Humboldt (1810), perhaps the greatest of his pupils, in his extended observations in the Cordilleran system of the American continents, traced a direct connection between metallic deposits and the eruptive rocks.

Observation must have convinced many of Werner's pupils of the untenability of his peculiar views on the formation and filling of veins long before their final refutation was published by his successor, von Beust, in 1840, but reverence for his memory doubtless prevented a definite expression of their opinion in print.

Von Herder, in his work on the Meissner adit, published in 1838, classified the various theories on the origin of veins that had been held up to that time as follows:

(1) Theory of contemporaneous formation (with the enclosing rock);

*Presidential address before the Geological Society of America, at St. Louis, December 30, 1903.

(2) Theory of (filling by) lateral secretion, or by material derived from the enclosing rocks;

(3) Theory of (filling by) descension or filling from above;

(4) Theory of (filling by) ascension, or filling from below; the latter subdivided into:

(a) By infiltration, or solutions from mineral (thermal) waters;

(b) By sublimation, or by ascending steam;

(c) By sublimation, or in gaseous condition;

(d) By injection or in igneous fluid state.

He was thus apparently the first to apply the now time-honored terms 'ascension,' 'descension,' and 'lateral secretion,' though the idea was clearly expressed 30 years before by Cuvier's collaborator, Alex. Brogniart, when, in an attempt to reconcile the Huttonian and Wernerian schools, he showed that no one theory could fit all kinds of veins.

The theories of contemporaneous formation and of descension had by this time become practically obsolete among the Germans, and had never had much standing among geologists of other nations. German geologists, who have been the most assiduous students of vein phenomena in the field, have always been inclined to assume that vein minerals have been deposited by precipitation from aqueous solution, differences of opinion having been mainly as to the provenance of the waters. Doubtless the influence of Werner had much to do with their mental attitude, but it is also to be remarked that this method of formation best fits the ore-deposits of their country.

In England, the home of Plutonism, on the other hand, no very decided views on theories of ore deposition were held. John Macculough, in 1821-3, after a discussion of the Wernerian-Huttonian views, wisely concludes that it is necessary to study nature's processes more closely before a satisfactory theory can be formulated. He enumerates the minerals occurring in ore-deposits which may be formed by infiltration or solution and by sublimation, contending that many vein materials can be produced in either way, and recommends further investigations along that line.

John Taylor, in his report on mineral veins to the British Association in 1833, makes a similar review and arrives at similarly indefinite conclusions.

Later, De la Beche, in his geology of Cornwall (1839) says: "The theories of the day divide themselves into, first, the contemporaneous formation of mineral veins with the rocks which enclose them; second, the filling of fissures formed in rocks by the sublimation of substances driven by heat from beneath upwards; and, third, the filling of fissures in rocks by chemical deposits from substances in solution in the fissures, such deposits being greatly due to electro-chemical agency."

The contemporaneous theory, according to him, was still generally held among Cornish miners, but he himself is evidently inclined more to the theory of deposition by solutions ascending under the influence of internal heat, the water being furnished from the sea, which covered many of the Cornish lodes.

The electro-chemical theory, which had already been suggested in 1810 by Bergrath, Schmidt, and for a time enjoyed a certain popularity among English geologists, was founded mainly on observations made on the mine waters of Cornwall by Robert Were Fox. This theory assumed that vein minerals had been precipitated from solution under the influence of electric currents. It would appear, however, that, owing to the imperfect knowledge of chemistry of that time, the believers in his theory assumed electric currents to be a necessity for the production of certain reactions when they only served to facilitate them. Fox's observations on the action of mine waters on minerals were, moreover, rendered somewhat inclusive by the fact that he did not distinguish between primary vein minerals, and those that have been formed during their secondary alteration by surface waters.

Among French geologists, Plutonist views were predominant from the first, even those, who, under the influence of Werner's magnetic teaching, had for a time embraced his Neptunist theory, soon recanted them, when their field of observation had widened so as to include volcanic regions. The cosmic theory, generally known as the nebular hypothesis, the one which has been most universally accepted by geologists as an explanation of the earth's beginnings, was the work of a French mathematician, Laplace (1796). Hence, in seeking to account for the origin of ore-deposits they were naturally inclined to look for igneous agencies. Thus, A. Burat, well known through his work on applied geology (1843), took extreme Plutonic views and divided the copper, lead, and iron deposits of the Italian peninsula, which he had especially studied, into (1) dikes or eruptive masses, with gangue of amphibolite and ilvaite; and (2) irregular veins of contact between eruptive serpentine and sedimentary rocks. The Elba deposits of specular iron, which he regarded as striking instances of the first class, he considered to have exercised an elevatory as well as metamorphic action on the enclosing rocks at the time of their injection. Fournet, another prominent authority on the subject, maintained a theory of igneous injection for vein-fillings as late as 1859.

As in Germany it was the professors in the mining schools, especially that at Freiberg, that during the early part of the century led in forming scientific opinion as to ore deposition, so it was the School of Mines at Paris that later furnished the leaders in that branch of geological thought. The French students of underground phenomena were at a certain disadvantage as compared with their German brethren, in that they were obliged to travel to foreign countries to study large mines, whereas the German schools were all situated in the midst of important mining districts. On the other hand, while the German displays great industry and acuteness of observation in his collection of facts, the Frenchman has a remarkable facility of logically grouping them, and of clearly and concisely stating the conclusions to be drawn therefrom. The French language, moreover, by its structure is much better adapted to a concise presentation of scientific concepts, that can be readily understood by the reader, than the German, which is likely to be involved and cumbersome in its mode of expression. Hence, toward the middle of the century the influence of the French geologists on genetic speculation become predominant, especially as it was based on synthetic experiment, a branch of geological investigation, which for a time they practically monopolized.

The first of the French geologists who has left an enduring impress upon the theory of ore deposits was Elie de Beaumont, who for nearly 50 years occupied the chair of geology at the Paris School of Mines (1827-1874). In 1847 he published, as an abstract of his lectures, his well-known paper on 'Volcanic and Metalliferous Emanations,' in which he does not claim to formulate a complete or final theory, but presents his views as explanations which seemed to him best to fit the facts of nature as then known. His conclusions are briefly: That the metallic minerals in veins of incrustation (since called 'crustification') find their ultimate source in eruptive rocks, from which they emanate at first in gaseous form. As they pass through long canals or fissures, at greater distances from the center of eruption they must condense and thus form deposits analogous to those of springs at their point of exit. The metals in veins are found united less frequently with oxygen than with certain elements to which the name 'mineralizers' has been given, and which are not only volatile themselves but possess the property of rendering volatile many substances with which they combine. These are sulphur, selenium, arsenic, antimony, phosphorus, tellurium, chlorine, bromine, and iodine, etc.

Mineral springs he divides into principal or hottest thermals, which are fed by gases emanating directly from eruptive masses that reach the surface in a fluid state, and, second, less heated springs which often accompany the former. The latter are fed by meteoric waters which descend until they come in contact with hot rocks and, when heated, ascend again, and in their passage may be charged with mineral substances.

Vein deposits may be found by either class of thermals; the second class would form deposits not only in ordinary fissures, but also in those already charged by direct emanations. It is difficult to account for the gangue minerals as direct emanations, since they are not volatile except such as are combined with fluorine. Certain deposits without gangue in eruptive rocks and deposits in limestone in contact with eruptive rocks, associated with garnet, ilvaite, and similar minerals may have been deposited by sublimation, but these are exceptional. For most veins he admits, in accord with Bischoff, that the earthy minerals must have come from the decomposition of the country rocks. The greater proportion of true veins (veins of incrustation) he considers to have been formed by deposition from waters circulating in cracks in the earth's crust. In this his theory resembles Werner's, but differs from it in assuming that the solutions were ascending rather than descending. Werner's argument in favor of descending waters, namely, that veins become poorer in depth, he considers not well founded, the facts of nature rather going to prove that the solutions became weaker as they approached the surface.

Stanniferous veins, which contain a great number of the rarer elements and are associated with acid rocks, are the type of the first class; while ordinary, or plumbiferous veins, which are characterized by the important role of mineralizers and the absence of anhydrous silicates, are usually associated with basic rocks.

His reasoning is evidently based largely on his observations in Cornwall, and on an assumed difference in the origin of granite and of volcanic rocks in general. Granite, he assumes, owes its crystallinity less to the fact of having crystallized at great depths than to its contents in water (2 to 3 per cent), which enabled it to remain in a pasty condition much below its fusion point and thus allowed quartz to take the impress of other minerals. The

minerals of the first group of veins form part of the outer crust (penumbra) of granite bodies, as granite once formed the outer crust of the earth.

The products of volcanic eruptions he divides into two classes: (1) the lava-like, which consists of silicates in a molten condition; (2) the sulphur-like, which emanate in a molecular condition. To the latter alone can the formation of vein minerals be attributed. The term 'solfataric,' which was employed by subsequent writers to describe the action of the sulphur-like emanations, has since been very generally used by writers on ore-deposits in a sense which is not always strictly accurate.

Although de Beaumont's views are based on some premises no longer considered tenable, they mark an important advance in this line of research, in that they may be said to be the first fruits of organized field investigation, for the first geological surveys, those of Great Britain and of France, had been founded about ten years before, and the first geological map of France had just (1841) been completed by the latter survey, of which he was the founder and director.

This was also an era of experimental investigation, as well as of investigation in the field. Following the example of Sir James Hall, who had, as early as 1805, spent some years in experimenting on the transformation of rocks under the combined influence of heat and pressure, French geologists were actively employed in attempting, by synthetical experiments in the laboratory, to imitate the processes of nature in the formation of rocks and minerals, especially of vein minerals. Prominent among those engaged in this work were Berthier, Becquerel, Ebelman, Durocher, Sénarmont, and Daubrée. At first with heat alone, and later employing heat and water combined, always under pressure, they succeeded in reproducing artificially a great number of the minerals of rocks and veins. Sénarmont (1849-51), by the aid of water at temperatures of 130° to 300° C., formed artificially thirty of the principal minerals found in ore-deposits, including quartz. The results of these experiments did not, however, prove decisively the agents which nature has employed, since they demonstrated that the same mineral may be formed by several different methods. This was appreciated by Daubrée, who, commencing his synthetical experiments with the artificial production of cassiterite in 1844, carried on experimental investigations into the mechanics of rock fracturing, the flow of subterranean waters, and rock metamorphism in general, to near the end of the century. He was particularly impressed by his studies of the mineral processes that have gone on since Roman times in the masonry of old thermal establishments at Plombières, Bourbonne-les-bains, and elsewhere, in which he thought to trace the actual processes of vein formation. His works on 'Experimental Geology' (1829) and 'Subterranean Waters' (1887) which contain the first philosophic discussion based on experiment of the physics of the rock fractures that constitute passages for the circulation of underground waters, are still classic works of reference for the students of ore-deposits. Daubrée understood veins to be fractures formed by dislocations of the earth's crust under pressure-strains and filled by deposits from aqueous solutions, generally heated by contact with igneous rocks, from which, in certain cases, they may have directly emanated. From his observations at Plombières, he inferred that most minerals are soluble, if given sufficient water and time, and that great heat and pressure are not absolutely necessary prerequisites. Some of the materials of veins he admitted may have been derived from the surrounding rocks.

(To be Continued.)

THE ELK LICK MINES OF THE SOMERSET COAL COMPANY.

The Somerset Coal Company, formed early in 1902, is a consolidation of a number of mining properties in Somerset county, Pa. Most of the properties were rather small concerns; still the aggregate yearly capacity of the mines was given at the time as 1,560,000 tons, and the total production in 1902 was over 1,213,000 tons. The properties are situated in the central and southern parts of the county, in the sixth and ninth bituminous inspection districts, and ship over the Baltimore & Ohio railroad. As the properties are rather scattered, the company for convenience of management divides them into three districts, the district superintendents living at Meyersdale, Somerset and Garrett. A large amount of money has been spent on some of the mines since the consolidation, for better surface equipment and needed improvements underground, and these mines are now in good condition. In the Meyersdale district the company has 11 mines. The equipment of the most important mines in the district is described here. These properties include the Elk Lick No. 1 and No. 2, Thomas and Summit mines, 1½ miles south of Meyersdale. The largest of these are the Elk Lick No. 1 and the Thomas. But the output of the Elk Lick No. 2, which is to be chiefly used for making coke, will probably be increased greatly before long, as the company has made extensive improvements with this end in view.

TIPPLE AND COKE OVENS, ELK LICK NO. 2.

At Elk Lick No. 2 the old battery of 75 beehive ovens has been taken down. Within a year the company has built 215 ovens, and will ultimately have 270 there. The new ovens are arranged in a loop, there being a single block along the sides and a double block in the middle. The ovens are of the regulation beehive type, 5 ft. high and 12 ft. in diameter, making 48-hour and 72-hour coke. The ovens will be supplied by an electric trolley line having a 7-ton larry equipped with a 25-h. p. General Electric motor and two trailer larries. The three larries were built by Kenney & Company, of Scottdale, Pa. The larries have double discharge, so that they can be used in feeding the center block of ovens. Sixty-pound steel rails are used for the larry line over the ovens. At Elk Lick No. 2 the company has completed a large tipple and storage bin 65 ft. high. The run-of-mine coal will be screened, the screenings going direct to the bin and the lumps being crushed by a Barton & Tierney crusher, having a capacity of 100 tons per hour. This crusher will be belt-driven by a 35-h. p. General Electric motor on the top floor of the tipple, the object of this arrangement being to enable the top-man to see to the dumping of the cars and the work of the crusher at the same time. At Summit mine the company has built a battery of 30 ovens.

At Elk Lick No. 1 is an old tipple where run-of-mine coal is loaded on hopper cars by a chute from an ordinary hinged dump. An Ottumwa box-car loader, capable of loading 35 cars in a 10-hour day, has recently been installed to facilitate shipments to special consumers.

Two seams will be worked at this group of mines—the big or Pittsburg seam, which here runs from 6 to 9 ft. thick, and the Redstone, 40 ft. above it, which is about 4 ft. thick. The Pittsburg seam carries, about 2 ft. from the bottom, a thin parting of bony, and also carries occasional streaks of splint coal. The Redstone seam has a parting of slate, and is rather high in sulphur for making good coke. The coal lies nearly flat, the beds forming part of

what is known as the Salisbury basin. Most of the work done hitherto has been on the Pittsburg seam, but the company is preparing to open the Redstone by planes driven from the Pittsburg. In general the coal in both veins is blocky, but has no regular butts and joints. Instead, it is cut by 'splits' that sometimes run hundreds of feet, and vary considerably in direction and dip. The system of mining used is the double-entry or airway and gangway. Butt headings are run from the gangways, and rooms turned from them at right angles. The rooms are thus sometimes run across the splits and sometimes on them. The rooms are 300 to 350 ft. long and 18 ft. wide; pillars are generally 30 ft. wide. Owing to the bottom coal in both veins being rather impure, mining machines are not used, but all coal is broken down by hand labor. The mines are not gaseous, the coal carrying much less volatile matter than in the Pittsburg district proper, and open lights are used for mining. Ventilation is by furnace except at Elk Lick No. 1; there is a Brazil fan 12 by 6 ft. that passes 60,000 ft. of air per minute. It was built by Kenney & Company, of Scottdale.

Mules and electric locomotives are used for haulage in the mines. There is one General Electric locomotive at Elk Lick No. 1, one at Elk Lick No. 2 and one at the Summit mine, all taking current at 500 volts. Thirty-pound steel rails are used on the main haulageways. the longest haul by locomotive being 3,000 ft., while the steepest grade on this line is 2 per cent. The mine cars hold 2¼ gross tons of coal, and the 10-ton locomotives haul about 25 cars at a trip. The coal at No. 1 mine is hauled to the top of the new tipple by mine locomotives, and at No. 2 is hauled to the head of an outside plane; thence it is run down to the tipple by wire rope, three cars to a trip. The arrangements at the head of this plane are such that but three men are needed to break up the 25-car trips, weigh the coal, tend the plane, oil cars and make up return trips.

Electricity for the locomotives, and for a pump at Summit mine, is supplied from a central power station. This is a substantially built structure containing boiler and engine room, having concrete floor, brick walls and a slate roof supported by steel trusses. In the boiler room are three 150-h. p. horizontal tubular boilers, made by the Union Iron Works, of Erie, Pa., and a Smith-Vaile boiler feed-pump. In the engine room are two 16 by 25-in. Ball & Wood engines direct-connected to two 150-kw. General Electric direct-current generators, wound for 500 volts with an overload of 575. One of these units supplies power, while the other is held in reserve; both may be used in emergencies. A fine switchboard has six panels; one for each of the four mines, one for the larry line over the ovens, and one for the motor running the pump at the Summit mine. Each panel has an automatic switch to prevent a short circuit at one mine affecting the others. The exhaust steam from the engine goes to a feed-water heater. The general arrangement of the boilers and engines, and the care taken in the piping, make the plant a model one.

This group of mines, when running full time, employs nearly 500 men below ground, while the output in 1902 was about 455,900 tons. J. C. Brydon, of Somerset, is superintendent of mines for the Somerset Company, and A. G. Smith, of Meyersdale, is superintendent of the Meyersdale division mines.

A NEW QUICKSILVER FIELD IN BREWSTER COUNTY, TEX.

By Wm. B. Phillips.*

As I have just returned from an examination of the new quicksilver field in Brewster county, some notes concerning it may be of interest.

The new discovery was made last summer by Ventur Bustos, a Mexican, who was prospecting in the region southeast of the Chisos mountains, in the southern part of Brewster county. According to the survey of Mr. M. W. Harmon, county surveyor of Brewster, at Alpine, Texas, the discovery was made in Section 32, Block G 3, Dallas & Wichita Railroad. Under the system that maintained several years ago, this block was surveyed into sections of 640 acres on the alternate system plan; that is, the land was divided between the railroad and the public school fund, the evenly numbered sections being given to this fund and the railroad obtaining the others. Section 32 would then belong to the public school fund, and mineral claims could be located on it under the terms of the Texas mining law. The administration of the public school lands is in the hands of the commissioner of the General Land Office, Austin, Texas, but applications for a survey of a claim must be made to the county surveyor. The United States owns no public land in Texas, for when this State came into the Union it reserved for its own use the public lands within its domain.

The new quicksilver district lies southeast of the Chisos mountains and within six miles of the Rio Grande. It is best reached from Marathon, a station on the Southern Pacific Railway, 226 miles southeast of El Paso and 400 miles west of San Antonio. From this point it is distant about 100 miles, as the road now runs; but it would be possible to reduce this to 75 miles by proceeding along the foothills of the Chisos mountains, leaving Boquillas to the southeast. The road from Marathon crosses the Del Norte gap and goes by way of Bone Spring.

After leaving Marathon there is no place where one may stop over night, or secure provisions until he reaches Boquillas, 83 miles. Water can be obtained at convenient intervals along the road, but one must go with his own outfit, including provisions, bedding, etc. A buckboard, with room for two persons and the driver, will soon be placed on the road from Marathon to Boquillas, but from Boquillas to the new district is 25 miles, and one must have his own conveyance. At Boquillas provisions may be obtained at the store of M. A. Ernst. The road then runs down Tornillo creek to San Vincente and up the Rio Grande to the ranch of Martin Solis, six miles from the cinnabar discoveries. One may also go along the road toward Talley's ranch, leaving Solis's ranch to the south.

Geologically, the new district shows a close resemblance to the Terlingua district, which was fully described in *Bulletin* No. 4 of the University of Texas Mineral Survey. Mr. R. T. Hill, of the United States Geological Survey, also described the Terlingua district in the Engineering and Mining Journal, Vol. LXIV, No. 10, and Mr. E. P. Spalding in the same Journal, Vol. LXXI, No. 24. The associated rocks are limestones and shales of the Cretaceous, probably Austin chalk and Edwards limestone. The geology of the new district has not yet been worked out in detail, but this Survey will place a party in the district this season. There are many intrusions of igneous rock in the immediate locality of the new find, and it is evident that these have had an influence upon the occurrence of the cinnabar. The present openings are in limestone on the east side of a limestone ridge which has been cut by rhyolite. This ridge forms the crest of an anticline, the limestone and shale strata inclining in opposite directions at angles varying from 10° to 20°. Along the southward extension of the ridge the intrusions of igneous rock become more frequent and more pronounced, while on the north they gradually merge into the great volcanic intrusions of the Chisos. This mountain range forms a great ellipse of about 15 miles in width and 100 miles around. In Mt. Emory it rises to a height of about 7,500 ft. and presents, from every point of view, an extremely rugged outline. The Terlingua sheet, just published by the United States Geological Survey, touches its western edge, while the Chisos sheet, now surveyed and in course of engraving, covers the entire area. The range is well watered and has fine grass, but the panthers, mountain lions, etc., play havoc with calves and colts, so that the main basin is still comparatively untouched.

The Chisos mountains are to be regarded as the dominant feature of all of this part of Brewster county, topographically and geologically, and much of the geological history of the region is intimately connected with this enormous intrusion of igneous rock through the Cretaceous. Erosion, which, even in that semi-arid region, has worked great changes, is here seen in its best estate, carving from the clays, softer limestones and shales a multitude of fantastic shapes; towers, domes, castles, terraces succeed each other in a dance of topographic delirium.

The district is likely to be of prominence for its mineral wealth, the following minerals having been already noted: Cinnabar, galena, hematite, limonite and copper compounds. A specimen of horn-silver was given to the writer by a reliable gentleman, who assured him that it came from the Chisos. On assay it yielded 1,120 oz. silver. The locality has not yet been identified.

To the southeast of the Chisos, and distant from the main body of the range about 25 miles, is the famous silver-lead mine near Boquillas, Mexico. It is at the foot of a tall finger of limestone known locally as Puerto Rico. From this mine, when it was in operation a few years ago, 435 car-loads of silver-lead bullion were shipped. Disagreement among the operators led to the closing down of the mine and the removal of the smelter.

The new quicksilver district shares with Terlingua a scarcity of fuel, the nearest large supply being along the upper slopes of the Chisos. But it is better situated with respect to water than the Terlingua district, the Rio Grande being but six miles distant along a 'draw' which contains no hills of any moment. The time may come when it would be well to consider the coal that lies to the north and east of the Chisos as a source of fuel. The seams are not thick, the maximum being about 14 in., but some of the coal is of good quality. The area of the field has not yet been outlined, nor has there been any detailed study of it, this work being reserved for the coming season. It is not thought now that there is a large coal-field in Brewster county, or that

*Director of the University of Texas Mineral Survey.

any considerable amount of the coal that is present lies within commercial possibilities. But there is probably enough for the use of the quicksilver furnaces, and the field, at Kimble Pits and Chisos Pen, on Rough run, is within 15 miles of the eastern extension of the Terlingua district. Some coal was mined here in a crude way several years ago and taken to the smelter at Boquillas, Mexico, but there has been no work at any of the pits within the last three years. The new district, for which the name of Boquillas is proposed, is likely to show other developments within the year. The discovery of cinnabar east and southeast of the Chisos mountains was predicted by the writer in an article published in the San Antonio *Express*, August 20, 1902, after a study of the conditions there; but it was not until the summer of 1903 that any actual discoveries were made.

It is not to be doubted that other finds will be made this year, for the region is favorable to the existence of quicksilver ore.

PREPARATION OF RADIUM CHLORIDE.*

BY MME. S. CURIE.

The residue remaining after the extraction of uranium from pitchblende is treated with a boiling, concentrated solution of NaOH, which dissolves lead, silica and alumina. The residue is washed free from Na_2SO_4 and treated with HCl. Polonium and actinium pass into solution and are recovered, the former in the precipitate thrown down by H_2S, and the latter in the precipitate thrown down by ammonia from the filtrate from the sulphides. The portion insoluble in HCl is washed and boiled with a concentrated solution of Na_2CO_3. The insoluble carbonates that are formed are washed and dissolved in HCl (free from H_2SO_4). The solution is treated with H_2SO_4 and the precipitate (10 to 20 kg. from 1,000 kg. of ore residue), which consists of the sulphates of barium (together with radium and calcium), lead and iron, and a trace of actinium, is boiled with Na_2CO_3 solution. The insoluble carbonates are dissolved in HCl, the lead precipitated as sulphide and filtered off, and the filtrate treated with Na_2CO_3. The insoluble carbonates (of barium, calcium and radium) are converted into chlorides and the latter washed with pure concentrated HCl, which dissolves the calcium chloride. The residue consists of barium and radium chlorides. It amounts to about 8 kg. from 1,000 kg. of material and has a radio-activity 60 times as great as metallic uranium.

The barium-radium chloride is dissolved in distilled water, the solution heated to boiling and then allowed to cool. Two portions, A and B, are thus obtained, of which B, consisting of the more soluble chloride, is the less active. The fractionation is repeated with each of the two portions, and the less active fraction of A is added to the more active fraction of B. The operations are repeated with each portion until a certain fixed number (for example, 6) of fractions are obtained; the most soluble portion will then have only an inconsiderable radio-activity, and is withdrawn from the process. In the next series of fractionations a new portion is made from the most soluble portion, and the crystals of the most active portion are withdrawn. In this way the activity of each fraction is maintained practically constant at about five times that of the next more soluble portion. When the quantity of liquid to be decanted becomes small, water acidified with HCl is added, the proportion of acid being increased as the fractionation proceeds; toward the end it is necessary to work only with three or four fractions. When most of the inactive barium chloride has been removed, one fraction is withdrawn from one end and another (the active chloride previously removed) is added at the other end. The fractionation is continued until the crystals of radium chloride show a spectrum practically free from barium lines.

Radium chloride containing traces of barium chloride may be purified by dissolving in water and precipitating, by addition of alcohol, the barium chloride remaining dissolved in the slightly aqueous, alcoholic solution. Crystals of pure radium chloride, like those of barium chloride, are colorless, but when a certain proportion of radium is present in the mixed chlorides, the crystals have a yellow color after some hours, verging on orange, and sometimes pink; the color disappears in solution. The maximum degree of color is obtained for a certain amount of radium present, which fact is useful in checking the progress of fractionation.

The mean of three determinations of the atomic weight of radium in a specimen of the pure chloride was 225, assuming the element to be divalent. Besides the chloride, radium forms a nitrate, a carbonate and a sulphate, all of which salts resemble those of barium when freshly prepared, but they gradually become dark-colored. They are all luminous in the dark, and are the source of a spontaneous and continuous evolution of heat.

*From articles in *Chemical News*, 1903, Nos. 2282 to 2297; *Journal* Society Chemical Industry, December 31, 1903, p. 1363.

ANTIMONY SMELTING.—H. L. Herrenschmidt proposes (French patent, 333,340, June 24, 1903) to treat ore containing 40 to 50 per cent Sb in a converter on the hearth of which the proper proportions of wood, coke and ore are successively placed, the wood being first well lighted. The charge is then covered with another layer of coke and antimony oxysulphide from a preceding operation. Air is blown in under pressure, oxidizing antimony, the fumes of which are collected. Later, oxysulphides are distilled and collected. A certain proportion of metallic antimony is formed and tapped off.

MINERAL IMPORTS AND EXPORTS OF SPAIN.—Imports of fuel into Spain for the 11 months ending November 30 were 1,870,950 tons coal and 167,463 tons coke. Exports of minerals for the 11 months are reported by the *Revista Minera* as follows, in metric tons:

	1902.	1903.	Changes.
Iron ore.....	6,797,465	7,021,562	I. 224,097
Copper ore	866,165	965,758	I. 99,593
Zinc ore	78,085	106,785	I. 28,700
Lead ore	2,790	2,370	D. 420
Pyrites	403,498	509,828	I. 106,530
Salt	249,172	272,737	I. 23,565

Exports of metals for the 11 months were 42,783 tons pig iron, against 31,520 tons in 1902; 28,315 tons of copper, against 26,066 tons; 2,227 tons zinc, against 1,788 tons; 148,064 tons lead, against 154,602 tons in the preceding year.

IMPROVEMENTS IN CYANIDATION.

BY ALFRED JAMES.

(We have seen a private circular letter from Mr. Alfred James to his numerous correspondents all over the world; this letter is sent by him at the beginning of each year to his associates and others who communicate with him regarding matters described in his book on cyanide practice. Mr. James has many friends among our readers whom he does not know, and in order to reach them we have, with his permission, reproduced the larger portion of the letter referred to, knowing, as we do, that it contains much that is of general interest to millmen and metallurgists.—EDITOR.)

Filter-Pressing.—The development of this process for slimes-treatment has progressed to a greater extent than any other method during the past year. As I previously pointed out, the precipitation process invented and put into practice by Gilmour & Young was specially designed to suit specially inaccessible local conditions, and Gilmour has now installed a filter-press plant of the latest type in Nicaragua. Other similar installations are also being erected in Central America, notably in Nicaragua, by Philip Argall, of Denver, whom we all know as the former expert adviser of our American company, and by Bertram Hunt, in Costa Rica. Filter-press plants are also in operation in New Zealand—the Waihi has a large installation—South Africa, Eastern Asia and South America; but Australia, and particularly Western Australia, is still easily first in method and practice.

The main point is the thoroughness of the washing, and Arthur Yates has made some interesting experiments at the Redjang Lebong mine, in Sumatra, showing that this is mainly a function of time, the washing varying from anything up to almost absolute perfection for 3 to 3¾ hours' washing. In Western Australia, however, they claim practically a 98 per cent washing extraction of press contents, with a period of 1 to 1½ hours for washing. Marriner and Simpson have both done good work in this respect, and the latter calls attention to a very important point, viz., that assays of sections of pressed cakes are apt to be unreliable owing to the concentration of values in the lowest portion of the cake caused by the subsidence of the heavy mineral particles. Washing assays are therefore essential.

Some standard method of colorimetric test, similar to that by which we were able to gauge the contents of our old chlorination solutions to within a few grains per ton, would be most valuable. Those who were present in those days will remember that to a given quantity of the chloride solution we added HCl, plus a solution of perchloride of tin made by dissolving tin in hydrochloric acid with metallic tin always present in excess in the bottle. The addition of this to the hot solution gave a pink to purple color, of a tint which could be standardized. Cassel suggests the same method for our cyanide solutions, adding potassium bromate and sulphuric acid to get rid of cyanogen. His method, which appears successful with pure solutions, is to add 0.5 gram of potassium bromate to, say, 10 c.c. of the cyanide solution to be tested, in a boiling tube; pure concentrated sulphuric acid is gradually added with shaking, until the action starts; once started, no further addition of acid is needed. When the action has ceased, stannous chloride, prepared as above, is added drop by drop until the solution is just colorless; within half a min-

ute the purple color will form, and should then be compared with standard tints. A complete test may be carried out in 2½ minutes.

It is possible, however, this method may not be successful with works-solutions, on account of the zinc or other salts present. Moir suggests a more complicated method, which will be found in the *Journal* of the Chemical and Metallurgical Society of South Africa for September, 1903.

I have carried out a great many experiments on the washing of filter-presses of the present type, forcing aniline dye through cakes of lime, ground rice and other substances, and find there is a great tendency for the solution to run in certain channels depending on the structure of the plates, and I shall probably embody these results in some modifications of the standard Dehne press.

Cleaning-Up.—For cleaning-up, a great improvement is the introduction of smooth surface steel montejus; this entirely does away with the use of pumps for the handling of precipitate; the gold slimes are run from the boxes direct into the monteju and forced by compressed air into the press.

With reference to Tavener's work in South Africa, independent results in Africa have confirmed his results to a certain extent; but in Australia and elsewhere no such losses have been experienced as have been shown by Tavener's results on the Rand. This was to be expected, as in no other field has the use of oxidizing agents to purify the gold been brought into play to so great extent.

Tilting Furnaces.—Remarkably good work is done in Western Australia with these furnaces. Recently, at the Great Boulder mine, a clean-up of over 17,000 oz. was successfully accomplished in about 30 hours. The furnace was lit at 8 a. m., at 10 a. m. the first charge of precipitate and fluxes was added, and charging continued at about every half-hour until the crucible was well filled at 2 p. m., when the slag was poured off and the crucible recharged. These operations were repeated and the slag removed about every four hours. By 12 midnight—14 hours from the addition of the first charge — the crucible was emptied completely and 10,000 oz. of bullion recovered from the melt. The mechanism of the tilting furnace makes the pouring off of the bullion a simple matter, while the construction of the retort holding the charge appears to prevent much of the loss by volatilization or mechanical ejection.

In this connection the use of oil furnaces would undoubtedly be a great improvement; the saving of labor and trouble, from not having to continually coke the crucible and to distribute the glowing coke equally around the crucible, need scarcely be emphasized. I am making arrangements to have these furnaces installed. Wilfrid Holloway is proceeding to Korea to join Marriner (late of the Great Boulder Reef mine), who has started a complete and up-to-date filter-press installation at the British & Korean concession there; he has had considerable experience with these furnaces in America and speaks very highly of them.

Concentrate Treatment.—I have frequently taken occasion to point out that, particularly in Africa, there was great necessity for accurate investigation as to the absolute actual results obtained in economical treatment. Crosse and Lane-Carter have been doing valuable work with regard to the solvent condition of solutions; or, in other words, their effective capacity for the actual solution of gold; in the same way Tavener and others have been calling attention to the losses experienced in cleaning-up; and now H. S. Denny has presented a most valuable paper to the Metallurgical Society at Johannesburg, dealing, among other things, with the treatment of concentrates. He shows that the extraction obtained is low and the cost of treatment high; he also shows that, by sliming the particles, considerably better extractions will be obtained at a lessened cost.

Now, with regard to concentrates, all the world over we are confronted with the same problem, that if we do not concentrate out we have, in the sands, gold-containing particles which may require 30 days' treatment, or, in the case of Australian tellurides, even 90 days and longer. To slime all the sands for the sake of this small portion does not seem sound metallurgy, and practice is therefore in the direction of separating out (by vanner, Wilfley or spitzkasten) the coarser particles, regrinding them and treating them as slimes, while the freed sands have separate simple treatment. This will probably be the method followed in Western Australia.

On the other hand, instead of fine grinding we have an alternative method of treating our concentrates in roasting. West Australian experience shows a roasting cost reduced to 3s. per ton for a dead sweet roast, the roasted ore or concentrates having an original sulphur constituent, respectively, of 6 and 18 per cent, and a final sulphur content, as sulphide, of 0.04 per cent only.

It looks, therefore, as if a small roasting-plant, for concentrates only, may now be installed all the world over at each mine; but of course local conditions will decide as to whether roasting or fine grinding is more effective. With ores carrying a high percentage of silver, for instance, there can be no question of roasting at all; the method shown to give best results with these ores is simple sliming and agitation and filter-pressing.

Mechanical.—With reference to other improvements during the year, there has been a considerable advance in the application of mechanical methods to the disposal of tailings. Belt-conveyors are now in common use and their application will probably be extended forthwith, so that in future installations there will be no more superimposed vats, but collecting vats and percolating vats on the same ground level, with a belt running from under the collectors over, and discharging into, the percolators.

In this connection the use of automatic excavators has received considerable attention. In Africa, Behr has been putting in a bucket-elevator for this work, and, in America, Blaisdell and Butters have adopted the old disk harrow for a similar purpose. Where labor is dear such mechanical excavators are undoubtedly serviceable for a suitably built plant, provided the vat charges are not too slimy, the more so because, if there is any question of a vat not percolating properly, it can be immediately run out and emptied into an adjoining tank by the shiftman only. The excavators run along to the vat required, and empty its contents at the rate of 100 tons per hour, which are conveyed by a belt to any vat desired or to the tailings dump.

Diorite comes to us through the Greek, *diorismos,* meaning division or separation. The name was intended to describe the fact that the rock is formed by distinct portions.

THE BRITISH COLUMBIA-SNOWSHOE CONSOLIDATION.

By E. JACOBS.

About four years' experience of mining and smelting the big low-grade ore-deposits of the Boundary district of British Columbia has proved conclusively that there is little profit to be earned where operations are on a small scale. Realizing this, the directors of the British Columbia Copper Company, Ltd., of New York, and those of the Snowshoe Gold & Copper Mines, Ltd., of London, England, have arranged to consolidate their interests, subject to the sanction of the shareholders in their respective companies. The former company wants to increase its regular ore-supply and the treatment capacity of its smelter; the latter to share in the profits made out of smelting its ore. Their interests would seem to be best conserved by the consolidation. Some information relative to their properties follows:

Mother Lode Mine.—The Mother Lode group, situate three miles northwest from the town of Greenwood, in what is known as Deadwood camp, includes the following adjoining mineral claims: Mother Lode, Primrose, Sunflower, Tenbrock, Offspring and Don Julio. The Mother Lode was located on May 28, 1891, under a law then in force in British Columbia, but since changed, which restricted the size of mineral claims to 600 ft. in width by 1,500 ft. in length, and which gave extra-lateral rights. As this claim was the first location made in the camp, its locators had the choice of the ground, which they exercised to best advantage, placing their posts so as to take in all that part of the hill covered by the big outcrop of ore. Underground development has since proved that the opportunity to secure the greater part of the large ore-body was used to good purpose; notwithstanding the drifts and cross-cuts at the 200 and 300-ft. levels of the mine now total nearly 5,000 ft., at no point are these workings less than 200 ft. from a boundary line of the claim. This does not matter so much now, since adjoining claims on three sides of the Mother Lode were afterward secured by the British Columbia Copper Company.

The lode here worked is large; its length, either proved by the workings, or shown by croppings of ore beyond, being 1,100 ft. north from the main shaft, while an opening made in ore on the Primrose claim, about 700 ft. from the shaft in the opposite direction, indicates the probability of its extending at least that distance southward under the intervening drift. Its development was commenced in the summer of 1896, at which time the Mother Lode was under bond to several New York men who first organized the Boundary Mines Syndicate, and two years later the British Columbia Copper Company.

Until 1901, the development work and stoping done in this mine were along the lines usually followed in underground mining. It was found, though, that the ore was generally of a low grade, and that consequently it would be necessary to work the mine on a comparatively large scale and at a lower cost, so quarries were opened from the surface in the big ore-bodies. The main shaft had already been sunk to a depth of 325 ft. and levels opened at 200 and 300 ft. respectively. Latterly, the pillar and stope system, as fully described by the company's manager, Mr. Frederic Keffer, in an article published in the ENGINEERING AND

MINING JOURNAL of March 15, 1902, had been adopted, and a large body of ore broken down. The intention to deepen the shaft to 500 ft., and to run levels at 400 and 500 ft., respectively, was abandoned, and, after much of the broken ore had been hoisted and shipped to the smelter, ordinary underground mining gave place entirely to the quarrying methods that were

MOTHER LODE MINE, GREENWOOD, BRITISH COLUMBIA.

then adopted, and are still being followed at this mine.

There are now four quarries contributing to the daily output of 500 to 800 tons of ore, shipments varying according to the quantity of custom ores being received from other mines at the company smelter. The Mother Lode is capable of maintaining an output of 1,000 tons daily, if required. The four quarries are well-defined excavations, but the separating masses of rock are being gradually removed so that the divisions between them will disappear as the ore is broken down and shipped. They extended along the ore-body over a distance of 807 ft., and have a maximum width of 145 ft., the average width being 110 ft. The greatest depth is 140 ft., this being at one of the raises from the main tunnel below, and the shallowest is 30 ft. from the surface slope of the hill to the floor of the quarry. The average depth of the quarries is about 70 ft. The main tunnel runs 833 ft. into the hill and several branch tunnels aggregate about 660 ft. in length. There has been some dead-work in driving these tunnels, but, as a rule, they are in ore. There are four large raises from the main tunnel to the quarries above, these widening out at the top, and forming big funnels into which the ore is broken down, passing thence through hoppers into 5,000-lb. cars drawn by mules to a large crusher. Two other raises are being made to facilitate the handling of the ore.

According to the best geological authorities who have examined the district, the ore-bodies are altered limestone. The ores themselves may be classed into three general groups: 1. A calcite carrying copper pyrite and iron pyrite, these sulphides being sometimes massive and sometimes scattered in small crystals throughout the rock. Some quartzite is often present. 2. A silicate of lime, iron, magnesia and alumina, carrying both copper and iron pyrite, massive or scattered, and frequently also quartz, garnets or serpentine; often all three together. Occasionally, too, a small quantity of zinc-blende occurs in this class of ore. 3. An excessively hard magnetic iron oxide, with silica and copper pyrite; not often much iron pyrite. These several varieties of ore blend into one another more or less, but this general classification holds good. They all carry a little gold and silver, as well as copper. They have been found to make mixtures suitable for smelting, and experience has shown that they do not require preliminary roasting, their sulphur content not being in excess of that necessary to form the 45 to 50 per cent copper matte that is being regularly produced on first smelting.

In 1898 the Mother Lode mine was equipped with a power plant consisting of two 60-h. p. boilers; an 18 by 24 air compressor rated for 10 drills; five machine-drills; a 7¼ by 10 hoisting engine, and two auxiliary hoists. In 1901 a larger plant was installed, this including a cross-compound, condensing Corliss-valve, first-motion Jenckes hoisting engine, cylinders 22 by 42 in., 6 ft. diameter of drums, with two 80-h. p. boilers, and a Robins ore-sorting plant. Later ore-sorting was done away with, and a Jenckes-Farrel crusher was installed, together with a Jeffrey elevating machine. A second 24 by 36 Farrel crusher has been ordered for early delivery at the mine. These two crushers will have a combined capacity of 100 to 130 tons of rock per hour.

The output of ore from the Mother Lode mine, from the time it commenced shipping late in 1900, has now reached an aggregate of nearly 400,000 tons. To January 1 it was 383,388, in the following yearly proportions: 1900, 5,564 tons; 1901, 99,548 tons; 1902, 138,997 tons, and 1903 (December output estimated), 139,279 tons. The increase in 1903 was small, owing to a two months' suspension of smelting operations, the result of labor troubles at the Crow's Nest Pass collieries cutting off the coke supply for that period, and to larger receipts of custom ores at the smelters.

Smelter at Greenwood.—The British Columbia Copper Company's smelter at Greenwood was designed and erected by Mr. Paul Johnson, who commenced operating it early in 1901 and continued to manage it for two years. Last spring Mr. J. E. McAllister, who for some time had been assistant superintendent at the Tennessee Copper Company's smelter at Copperhill, Tennessee, assumed charge of the works, to which additions are being made. The capacity of the smelter, with two water-jacket blast-furnaces, built by the Allis-Chalmers Company, is 700 to 800 tons of ore each 24 hours. No barren fluxes are used, the ores of the Boundary district, when properly mixed, being self-fluxing. The smelter has a large sampling mill, which, together with the Connersville blowers supplying the blast for the furnaces, is steam-driven. Electric power will, however, be shortly substituted for steam, the current to be supplied by the Cascade Water, Power & Light Company, which has its electric generator station at Cascade, on Kettle river, at a point distant about 30 miles from the smelter.

A two-stand converter plant is being in-

SNOWSHOE MINE, PHOENIX, BRITISH COLUMBIA.

stalled at these works. For the time there will be five converter shells, 84 in. diameter and 126 in. long. A 40-ton 4-motor electric traveling crane will handle the matte in 5-ton ladles connected by launders with the furnace forehearths. The converter plant is so situated as to provide for a downward movement throughout—from the time the ore, etc., is dropped into receiving bins above the sample mill until

the blister copper is loaded on railway cars below the converter building—of all material that is to be passed through it.

Snowshoe Mine.—In 1899 the British Columbia (Rossland & Slocum) Syndicate, Ltd., a London, England, company having a capital of £100,000, secured an option on the Snowshoe mine situated within a quarter of a mile of the Granby Company's big mines at Phoenix, and about five miles in a direct line from the British Columbia Company's smelter at Greenwood. Mr. J. W. Astley, who, after 15 years' engineering and mining experience in Montana and Idaho, went to Rossland in 1896 to take charge of Mr. F. Aug. Heinze's mining interests in British Columbia, was appointed consulting engineer, and directed the opening up of the mine. In June, 1901, the syndicate having meanwhile spent more than $125,000 on development, plant, buildings, etc., the Snowshoe Gold & Copper Mines, Ltd., was organized in London to acquire and operate the Snowshoe group, consisting of the Snowshoe mine and the adjoining Pheasant, Alma fraction and Fairplay fraction mineral claims, containing in all about 120 acres.

There are on the Snowshoe large bodies of ore of similarly favorable smelting character to that of the neighboring Granby mines. It is of a higher average grade than that of the Mother Lode, the additional value being chiefly in gold. The mine has been opened to a depth of between 300 and 400 ft., with a considerable footage of development work done at the 200 and 300-ft. levels. Big stopes at both these levels contribute largely to the daily output of ore, the remainder being taken from several ore quarries opened from the surface. Total production to date is nearly 100,000 tons. Last year's shipments were about 75,000 tons and those of 1902 about 21,000 tons. Earlier shipments were for test purposes only.

The power equipment includes the first half of a 30-drill air compressor, three large and two small steam boilers, a 150-h. p. double conical-driven electric hoist with motor to operate it, electric power being obtained from Cascade; and all other necessary plants.

Last year some 60 men were regularly employed at the mine, which is now in excellent condition, with numerous ore-faces accessible, workings conveniently arranged, power equipment adequate and ore-shipping bins and railway trackage provided, so that a daily output of 600 tons of ore can be readily maintained.

LEHIGH CANAL COAL TRAFFIC.

The following statement, furnished us by the courtesy of Mr. F. R. Sayre, gives a comparative statement of the shipments of anthracite coal over the Lehigh canal in the years 1901 and 1903. In consequence of the damage done to the canals by high water in 1902, not a single boat-load of coal was shipped over the canal in that year. The figures are in long tons:

From:	1901.	1903.	Changes.
Mauch Chunk	221,421	68,005	D. 153,416
Beaver Meadow.....	20,349	3,983	D. 16,366
Mahanoy	3,012	....	D. 3,012
Schuylkill	7,317	477	D. 6,840
Upper Lehigh.....	14,643	2,091	D. 12,552
Coal dredged from river at Parryville dam	3,231	9,248	I. 6,017
Total	269,973	83,804	D. 186,169

All the coal shipped, except that dredged from the Parryville dam, was received from the Central Railroad of New Jersey.

In fact, no coal was shipped up to May, 1903, when the first boat-load passed through. High water again caused more damage on October 8, 1903, stopping shipments for the balance of the year. The short season of navigation thus caused and the small number of boats employed were the reasons for the great falling off in business on the canal shown by this statement.

STEEL CYANIDE TANKS FOR SOUTH AFRICA.—British makers have not nearly so large a share of this trade as might be expected, owing to the competition and low prices of German and Belgian manufacturers, who have a slight advantage in freights. In future British goods will be exempt from duty, while foreign mining machinery will have to pay 2.5 per cent. Cyanide tanks are made and fitted before being shipped to South Africa, and the quality varies little. The prices quoted are per ton, delivered at Johannesburg, and are about as follows: German, £16.63@£17.25; Scotch, £16.83@£17.33; Belgian, as low as £16; American, £16.87 on an average. Summed up, the gold mines pay an average of about $81.75 per ton for their steel cyanide tanks.

SCOTCH IRON PRODUCTION.—The Scottish Ironmasters' Association has issued the following statistics of production and consumption of Scotch pig iron—including foundry, hematite and basic—for the year ending with December, in long tons:

	1902.	1903.	Changes.
Production	1,295,074	1,288,075	D. 6,999
Stocks, Jan. 1.....	135,257	87,354	D. 47,903
Total	1,430,331	1,375,429	D. 54,902
Consumption	956,219	923,465	D. 32,754
Exports	386,758	323,904	D. 62,854
Total	1,342,977	1,247,369	D. 95,608
Stocks, Dec. 31..	87,354	128,060	I. 40,706

The number of furnaces in blast on December 31, 1903, was 80, and the average number in blast for the year was 86 furnaces.

AIR COMPRESSORS FOR THE ST. LOUIS EXPOSITION.

The central compressed-air power-plant at the St. Louis Exposition will contain two main compressing units; one cross-compound, two-stage, Cincinnati-gear compressor, having 13 and 24-in. steam cylinders, 22 and 14-in. air cylinders and 24-in. stroke with a displacement, at 125 revolutions per minute, of 1,300 cu. ft. per minute, and one cross-compound, two-stage, Meyer-gear compressor having 12 and 20-in. steam cylinders, 18 and 11-in. air cylinders and 18-in. stroke, with a displacement at 100 revolutions of 530 cu. ft. per minute. The first machine is to supply the general compressed-air requirements of the Exposition, while the second is to supply the transportation exhibits. The larger machine is of special interest, as being the first compressor of its type publicly exhibited, although a number of similar machines have been installed in private plants. A 1,500-ft. machine is at the present time being placed in the Jersey City power-house of the Central Railroad of New Jersey.

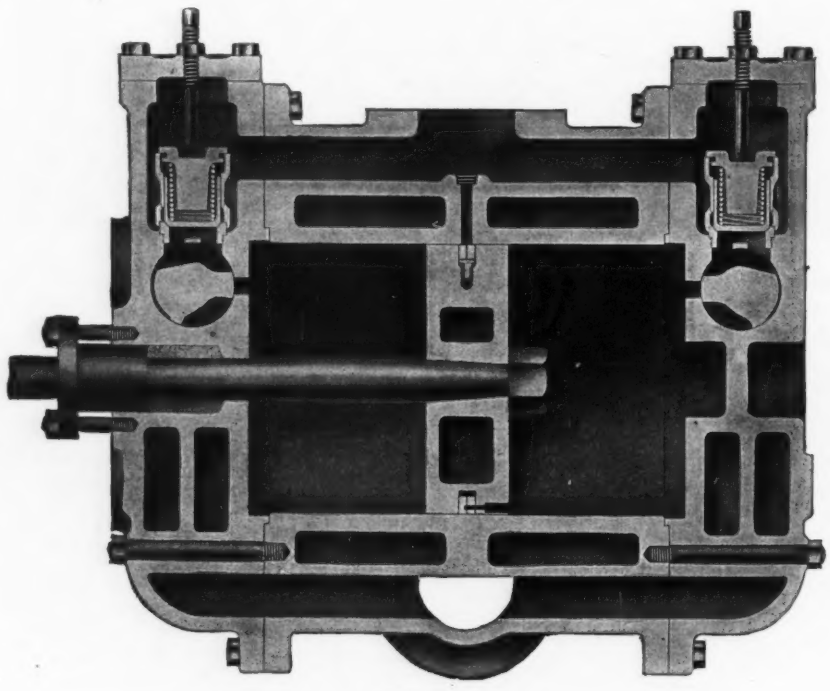


FIG. 1.

In these machines the frames are of massive construction, with a long bearing on the foundation, while the steam and air cylinders, joined in the direct line of thrust by heavy cast-iron housings, are also supported by bedplates under their entire length, the weight of each side being thus taken on two large bearing surfaces extending to the ends of the machine, avoiding over-hung cylinders, and giving the compressor great stability. The details comprise removable quarter-boxes and main bearings, steel forged connecting rods, with wedge take-up, specially large crank and wrist pins and cast-steel cross-heads with adjustable babbitted slippers, top and bottom, working in bored guides. The reciprocating motion is of the simplest possible character, this permitting low reciprocating weights without sacrifice of strength. These features allow satisfactory balancing, and, in connection with the long bearing on the foundations, insure an easy running machine. The steam valve-gear is of four-valve type. Steam distribution is effected by means of short, double-ported slide-valves,

working at either end of the steam-chest on a valve-face as close as possible to the cylinder bore, the port volume being restricted as far as the large valve area will allow. The exhaust valves are of the Corliss rotary type and are placed at the bottom of the cylinder. This construction has been followed in order to produce a valve gear having separate passages for the steam and the exhaust with corresponding reduction in cylinder condensation, together with short, straight ports and small clearance, at the same time requiring less complicated releasing gear. The action is positive throughout.

The air-valve gear is, however, the distinguishing feature of this machine, being designed to combine the positive action, noiseless operation and durability of the mechan-

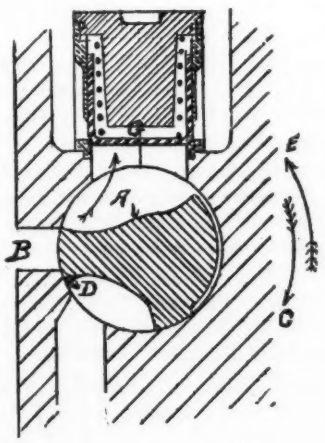


FIG. 2.

ically moved valve with the elasticity of the poppet valve. The noise and rapid wear of the poppet valve, due to the impact of the

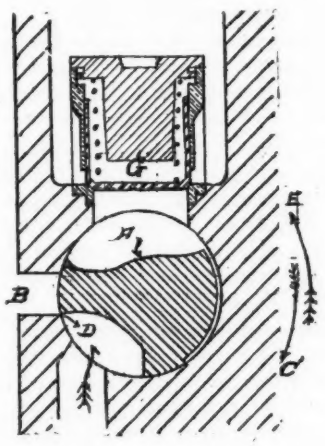


FIG. 3.

valves closing at the reversal of stroke, is eliminated by mechanically closing the passages underneath the poppet valve, and leaving a cushion of air upon which the latter seats. The action of the valve gear is clearly indicated by Fig. 1, showing the general arrangement of the cylinder, and Figs. 2 and 3, showing the position of the valve at various points of the stroke.

At the beginning of the forward stroke of the piston, the mechanical valve *A* is just closing the port *B*, the discharge edge of *A* being line in line with the upper edge of the port *B*, and the valve moving in the direction shown by the arrow *C*. After the piston advances a short distance the valve has reached the position shown in Fig. 3, in which the inlet edge of the valve *D* is just coming in line with the lower edge of port *B*. The valve continues to move in the direction of the arrow *C* until about mid-stroke, when it reverses to the direction shown by arrow *E*, bringing the valve back to the position shown in Fig. 3 at the end of the stroke. On the return stroke, the valve, still moving in the direction of the arrow *E*, returns to the position shown in Fig. 2, the discharge edge of valve *A* being in line with the upper edge of the port *B* and opening.

After the mechanical valve opens, the poppet valves *G*, which have had the entire return stroke in which to seat, prevent the flow of air back from the discharge passages to the cylinder, and remain closed until the pressure inside the cylinder slightly exceeds the pressure in the discharge passages. The poppet valves *G* thereupon open and remain open until the valve *A*, which in the meantime has changed its direction to that shown by arrow *C*, has resumed the position shown in Fig. 2, thus leaving a volume of air under discharge pressure in the space between the mechanical valve and the poppet valve, permitting the light springs back of the poppet valve *G* to seat them easily and gently during the return stroke.

It will thus be seen that the three fixed points in the compression cycle, namely, the opening of the inlet, the closing of the inlet and the closing of the discharge are positively and mechanically controlled; the opening of the discharge, which is the only variable point in the cycle, is controlled by the automatic poppet valves, which are relieved, however, of the necessity for quick closing, and are consequently free from the objectionable features of noise and rapid wear.

Indicator cards from one of these machines, operating at a speed of 150 revolutions per minute, show a steep expansion line on the air cards, indicative of the small clearance and high volumetric efficiency of the machine, the large valve area being shown by the practical coincidence of the inlet and atmospheric lines and by the uniform discharge line. A rounded admission of the steam cards, which might be deemed objectionable in ordinary engines, is due to the maker's practice of giving the steam valves a slight negative lead to offset the expansion pressure at the beginning of the air cards.

These machines are built by the Laidlaw-Dunn-Gordon Company, of Cincinnati, Ohio.

ABSTRACTS OF OFFICIAL REPORTS.

De Beers Consolidated Mines, Ltd.

This company owns a great property in South Africa, operating five diamond mines — De Beers, Kimberley, Premier, Bultfontein and Dutoitspan — besides extensive auxiliary works. Moreover, it practically controls the diamond output and market of the world. The report is for the year ending June 30, 1903.

The capital stock is £4,500,000, in 1,800,000 shares of £2 10s. each; of which 799,417 are preference shares, 999,417 deferred, or ordinary, shares, and 166 old shares not converted. The company has outstanding £4,418,245 in debentures, of which £2,489,420 bear 5 per cent interest and the balance 4.5 per cent. The reserve fund amounted to £1,882,011 at the close of the year.

The actual earnings, with the mine and operating expenses for the year, may be stated as follows:

Diamonds recovered	£5,241,173
Mining expenses	£907,145
Floor (treatment) expenses	524,723
Charge of lands	20,813
General and office expenses	133,513
Total expenses	£1,586,194
Net earnings	£3,654,979

Mining expenses were 57.2 per cent of the total; floor expenses, 33.1; general expenses, 8.4; land charges, 1.3 per cent. The total expenses were 30.3 per cent of the earnings.

The general income account may be summed up as follows:

Net mine earnings	£3,654,979
Interest, rents, etc.	134,031
Balance from previous year	798,686
Total credits	£4,587,696
War expenditures, balance	£30,542
Interest paid	316,075
Life Governors' interest purchase	100,000
Debentures redeemed	167,900
Depreciation accounts	751,415
Added to insurance fund	100,000
Reserved for investment	200,000
Total charges	£1,665,932
Balance of profit	£2,921,764
Dividends paid	2,175,000
Balance to current year	£746,764

The dividends paid were £1, or 40 per cent, on the preference shares, absorbing £800,000; and £1 7s. 6d., or 55 per cent, on the ordinary shares, requiring £1,375,000; a total of £2,175,000, as above.

The general statement of operations for the year is as follows:

	De Beers and Kimberley.	Premier.	Bultfontein.
Loads blue hoisted	2,370,503	1,987,543	318,410
Loads blue washed	2,561,940	1,989,598	317,185
Loads as floor	2,135,283	1,571,859	482,159
Diamonds found, carats	1,574,190	594,890	76,573
Carats per load	0.61	0.30	0.24
Value	£3,819,654	£1,021,277	£118,102
Value per carat	$11.65	$8.24	$7.40
Value per load	7.16	2.46	1.79
Cost per load	1.74	0.79	1.38

In this statement, we have reduced the averages per load and per carat to United States currency, to give readers a clearer idea of costs and profits.

In addition to the diamonds shown in the table above, there were 227,477 carats, valued at £281,434, recovered from 1,347,115 loads of tailings and debris washed; and 2,672 carats, valued at £706, recovered from old concentrates. This shows a total recovery of 2,475,802 carats, valued at £5,241,173, or $25,507,042 in United States currency.

Development work included at the De Beers mine 24,858 ft. tunnels and 722 ft. passes; at Kimberley mine, 12,894 ft. tunnels and 1,165 ft. passes; at the Premier mine, 2,130 ft. tunnels and 91 ft. passes; at the Bultfontein mine, 4,703 ft. tunnels and 147 ft. passes. The Dutoitspan mine is being developed on a large scale and provided with machinery for future work; the main shaft was sunk 65 ft. and is now 785 ft. deep, while 1,493 ft. tunnels were driven.

The acting general manager's report says: "At the De Beers mine mud-rushes have continued to be of frequent occurrence, but, although there were 29 rushes, only on two occasions have they been attended with fatal results—on November 1, 1902, two natives were killed on the 1,360-ft. level, and on May 14, 1903, two natives were killed on the 1,240-ft. level. The total length of tunnels filled was 15,344 ft., as compared with 6,989 ft. for the previous year. The cost of clearing away the mud and re-timbering the tunnels, which

amounts to about 20s. per foot, has been a considerable factor in our working expenses. It is, however, only a small item when compared with the loss sustained by the shutting down of many of the filling places and by the blue ground being mixed with the mud. The frequent occurrence of mud during the year has greatly reduced the output of this mine. Everything possible is being done to prevent mud-rushes. A new drain tunnel is being driven around the mine in the hard rock just below the black shales. It is expected that this will take up some of the water, which now finds its way into the mine and causes the mud. This work is not far enough in advance to say what the result will be. Judging from the appearance of the open mine, it should not be long before the hard rock is exposed. It is to be hoped that when this does appear we will be able to collect all the water, and thus end the mud-rushes, as in the case of the Kimberley mine. A number of natives have been employed during the year clearing the reef from the top of the hard rock, for the purpose of collecting the water. Large falls of reef have continually occurred, and on several occasions the work of months has been completely destroyed by a single fall. . . .

"The central power station has been complete for several months, and all apparatus has been thoroughly tested by a week of operation. After testing, the plant was closed down to await the arrival of transformers and switchboards for the substations, the manufacturers of the required apparatus being about five months behind in their deliveries. As the power station now stands, it is capable of delivering 3,000 h. p. Within the next few months, the power will be utilized to the extent of 1,300 h. p. at the mines and works. This will be sufficient for one turbine. Other work will be taken on as rapidly as possible, and in a year's time it is probable that 2,000 to 2,500 h. p. will be required."

The directors' report says: "The reserve fund in consols, which last year stood at £1,102,902, is now £1,089,650, which is the market value of the asset at June 30, 1903, the nominal value being £1,178,000. Shareholders will observe that a sum of £200,000 has been reserved for the purchase of additional government stock, and it is proposed to permanently increase the reserve fund by this figure.

"The stock of blue ground and lumps on De Beers and Kimberley floors at June 30, 1903, was 2,343,950 loads; at Premier mine, 1,571,859 loads; and at Bultfontein mine, 482,159 loads, the former having been taken into the accounts at 1s. 6d. per load, and the two last at 1s. per load, as on previous occasions.

"Your directors are pleased to be able to state that the contract with the Diamond Syndicate is working satisfactorily, and that notwithstanding the depression in other industries the diamond market has not been adversely affected and is still buoyant. Our sales during the year amounted to £5,241,173, as compared with £4,687,194 for the previous year.

"Since the close of the financial year the De Beers explosive works at Somerset West have been sufficiently completed to enable the company to produce dynamite, and our present requirements at Kimberley for mining purposes are being obtained from that source; contracts have also been entered into with the principal mining groups in the Transvaal, whereby they have undertaken to purchase from us half their monthly requirements for a period of seven years from September 1 last. Your directors are confident that in time the success of this industry will fully compensate shareholders for the large construction outlay involved, the whole of which has been drawn from the earnings of the company.

"It is satisfactory to be able to state that the company has continued to experience little difficulty in procuring the requisite amount of native labor for the mines and the dynamite factory.

"The chairman in his speech last year referred to the threatened lawsuit with the income tax commissioners in England for the payment of income tax in respect of the whole of the company's profits. Up to the present little progress has been made in bringing the case to a final issue, though the delay is not attributable to the company. Meanwhile income tax is being necessarily deducted from all dividend warrants and the amount in dispute is being reserved by the company, pending a final decision of the question.

"Your directors are able to state that the company's account against the Imperial Government has at last been settled. A claim of £54,641 was made, representing the amount to which they considered the company was justly entitled. A commission was appointed by the general officer commanding to go into the account, the chairman being an imperial officer who was in Kimberley during the siege, and who consequently had knowledge of the expenditure the company was called upon to incur. The commissioners recommended payment of £38,634, giving as their reason for not passing the whole of the account that vouchers for several items could not be produced, which was owing to the great hurry and confusion caused during the first stages of the siege in preparing fortifications and enrollment of the company's men, when it was found impossible to get receipts from the military for everything they required at that time. The War Office, however, was not prepared to accept even this finding and tendered £30,000 in full settlement, which the company, after some hesitation, accepted. We think it right to add that the company charged no interest in respect of the claim, notwithstanding the fact that the account ran over a period from September 15, 1899, to April 25, 1903, and that only cost price was charged for all material used. A statement of the expenditure and losses estimated to have been incurred by the company during the war amounts to £272,904. Shareholders will remember further that for the financial year ended June 30, 1900, no dividend was declared, which in the ordinary course would have amounted to £1,579,000. It will thus be seen that our aggregate war losses—direct and indirect—have been on a very extensive scale, but shareholders, who in the past have done so much for the development of South Africa, will not grudge even this large amount which has been disbursed in the successful effort to restore to the country the blessings of peace."

FLAME TEMPERATURES.—C. Féry reports the following determinations in *Comptes Rendus*, 1903, CXXXVII, xxii, 909-912: Bunsen burner, fully aired, 1871° C.; Bunsen burner, partially aired, 1812° C.; Bunsen burner, not aired, 1712° C.; acetylene burner, 2548° C.; alcohol, free flame, 1705° C.; hydrogen, free flame in air, 1900° C.; oxy-coal gas blow-pipe, 2200° C.; oxy-hydrogen blow-pipe, 2420° C.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

The World Almanac and Encyclopedia. 1904. New York; the Press Publishing Company. Pages, 544. Price, 25 cents.

Chamber of Mines of Victoria. Fifth Annual Report. 1903. Melbourne, Victoria; published by the Chamber. Pamphlet, 28 pages.

The Chemical Factor in Human Progress. By Dr. Peter T. Austen. New York; reprinted from the *Scientific American*. Pamphlet, 24 pages.

United States Geological Survey. The Production of Glass Sand in 1902. By A. T. Coons. Washington; Government Printing Office. Pages, 14.

New Zealand. *Official Year-book*, 1903. Prepared by E. J. Von Dadelszen, Registrar-General. Wellington, N. Z.; Government Printer. Pages, 756; with map.

The Copper Manual. Third Yearly Volume, 1904. Prepared by D. Houston & Company. New York; D. Houston & Company. Pages, 456; illustrated. Price, $3.

Steam Boilers. Their Theory and Design. By H. deB. Parsons. New York, London and Bombay; Longmans, Green & Company. Pages, 376; illustrated. Price, $4.

The Metric Fallacy. By Frederick A. Halsey. And *The Metric Failure in the Textile Industry.* By Samuel S. Dale. New York; the D. Van Nostrand Company. Pages, 232. Price, $1.

New Zealand. Papers and Reports Relating to Minerals and Mining. Prepared under the direction of the Minister of Mines. Wellington, N. Z.; Government Printer. Pages, 308; illustrated.

Free Employment Offices in the United States and Foreign Countries. Prepared by the Massachusetts Bureau of Statistics of Labor: Charles F. Pidgin, Chief of Bureau. Boston, Mass.; State Printers. Pages, 72.

Testing of Electro-magnetic Machinery and Other Apparatus. By Bernard Victor Swenson and Budd Frankenfield. New York; the Macmillan Company. London; Macmillan & Company, Ltd. Pages, 420; illustrated. Price, $3.

Diplomatic and Consular Service of the United States. Corrected to September, 1903. Compiled by the Bureau of Statistics of the Department of Commerce and Labor. Washington; Government Printing Office. Pages, 32; with maps.

Transvaal Mines Department. Report of the Government Mining Engineer for the year ending June 30, 1903. H. Weldon, Government Mining Engineer. Pretoria, Transvaal; Government Printing Office. Pages, 200; with maps, tables and illustrations.

Porphyritic, that is, like a porphyry, a term describing a crystalline rock having a mottled appearance due to the predominant development of one of its constituent minerals.

Contact deposits are those occurrences of ore which are found along the plane of contact of an igneous rock where it traverses, covers, or underlies a sedimentary rock.

BOOKS REVIEWED.

A Laboratory Guide to Qualitative Analysis with the Blow-pipe. By F. W. Martin. New York, 1903; John Wiley & Sons. Pages, 47. Price, 60 cents.

This is a handy little volume which aims to place the analytical chemist in possession of the necessary data to determine inorganic compounds by blow-pipe methods. The blow-pipe has long been a necessary adjunct of the mineralogical laboratory, but as yet it has found only limited employment in practical chemistry, although it might serve a useful purpose here as well. The book contains a series of tables showing the results of blow-pipe reactions upon chemical substances and describes the apparatus and methods by which such reactions are obtained.

Traité Théorique et Pratique des Moteurs à Gas et à Pétrole. Volume I. By Aimé Witz. Paris, 1903; E. Bernard. Pages, 504; illustrated. Price of the two volumes (in New York), $10.50.

This standard treatise on petroleum and gas engines is now undergoing the fourth revision since its first appearance in 1886. The present volume bears evidence of very thorough work on the part of the author in recasting the material previously included, and, at the same time, shows that every effort has been made to keep pace with the rapid progress in this field of mechanics. The first part of the treatise is devoted to the history and classification of motors and to a discussion of the different combustibles used; due space is given, also, to the subject of gas producers. In connection with the descriptive matter, the author goes very thoroughly into the theories underlying the designing and construction of gas engines, and develops the principles that govern their efficiency in practice. The second volume, now under preparation, will include a description of the different types of motors, with a general survey of their industrial applications.

Kalender für Elektrochemiker, sowie Technische Chemiker und Physiker, für das Jahr 1904. Edited by Dr. A. Neuburger. Berlin: M. Krayn. Pages, 575; illustrated.

The hand-book is intended to place the electro-chemist and those working along the lines of technical chemistry and physics in possession of such theoretical and practical information as is needed in every-day practice. That there is a field for a publication of this character is apparent to everyone who has followed the recent rapid development of electro-chemical science. The present volume has been prepared by the editor of the *Elektrochemische Zeitschrift,* and seems to fulfill its objects in a very thorough and satisfactory manner. The information is arranged under three heads—electro-technology, chemistry and electro-chemistry—while a supplementary volume covers the subjects of mathematics, physics, mechanics and fuel in their relation to chemical technology. The book is replete with tables and formulas that are extremely useful to the chemist. The only salient defect we have been able to discover is the lack of an index, which necessarily detracts somewhat from the facility with which it may be consulted. There is a table of contents at the beginning, however, which shows the general arrangement of the material.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Mining in Peru.

Sir.—A copy of the ENGINEERING AND MINING JOURNAL, recently to hand in this somewhat remote city of the Andes, reminds the writer that he had promised the editor a year ago some notes upon mining in this country. The field is too vast to be more than lightly touched upon in a single letter, and a year's travel and experience in this inexhaustible mining region only whets the appetite for further knowledge thereof. Those who, however, as the writer, know Mexico, can picture to themselves more or less the conditions prevailing in this republic, except that this is still in great part absolutely unexplored by English or American miners, and is, possibly, still richer than the Spanish-American republic of North America. Peru has, however, been brought into some considerable notice recently in New York by the very extensive operations of the Haggin-Vanderbilt Syndicate, which acquired the famous Cerro de Pasco copper mines. This really important American enterprise is too well known to require any description. Suffice to say that the most conservative calculation of ore in sight gives 3,000,000 tons of a minimum grade of 10 per cent copper, with undoubted probabilities of many times this amount in store.

The writer has traveled in various parts of the country, and has been tempted to 'denounce' a good deal of mining land. This includes gold, copper, silver-lead, quicksilver and coal. All these minerals exist in abundance, and it is safe to say that were some of these districts contiguous, for example, to California or Colorado, two or three railways would be hastening the laying of their rails thereto. But things move more slowly here, although there is no doubt that the near future will see an influx of American and British capital.

A very marked and advantageous feature of the country is the abundance of coal. This is often a high-grade anthracite containing only about 5 per cent ash, and is being used directly for smelting in water-jacket furnaces in some cases. As may well be imagined, openings for capital here are of great promise, whether it be in mining or other enterprises. More railways are needed, to tap the extensive mineral regions of the eastern and western slopes of the Andes, and the inexhaustible timber and india-rubber belts and forests of the interior. Peru is a well-watered country, due, in great part, to the perpetual snow-cap of the Cordilleras. The writer returned the other day from a tour of exploration for which he had been commissioned by the government, and as a result a road will be shortly constructed at this point—Huaraz—which will cross the Andes at 4,900 meters altitude and put in easier communication mining and timber regions on the eastern slope. The writer is the first white man to have crossed this particular pass. There are a number of mines here which ship their ores to Europe, such as copper ores of 20 per cent copper and 60 oz. silver, and silver-lead ores going up to 10 per cent silver and down to 100 oz. silver per ton, below which figure it does not pay to export. There are many small native lixiviation plants in the country which treat silver ores carrying between 50 and 100 oz. per ton. Below 50 oz. it does not pay to treat, and above 100 it pays better to export, under these methods the contained lead or copper generally going to waste.

There are some famous quicksilver mines in the country which might form a colossal enterprise for modern methods of exploitation.

In short, the variety and extent of the resources of the country must be seen to be believed. C. REGINALD ENOCK.

Huaraz, Peru, Dec. 15, 1903.

Mining in Eastern North Carolina.

Little has been said about this section of North Carolina, and aside from a short reference to it by Dr. Becker in his 'Report upon the Appalachian Fields,' I have seen nothing. It is, however, most interesting. The location is 100 miles from Norfolk, Va., and 20 miles east from Littleton and Louisburg, N. C. The belt passes through Nash, Franklin, Halifax and adjoining counties of eastern North Carolina.

While some attempts at modern mining have been made here, none indicate proper judgment or skilful management, and all work, save with rocker and sluice box, has been a failure. The Mann-Arrington, 5 miles from Ransoms Bridge, is the site of an idle 20-stamp mill. This mill was erected by Mr. Wood, of Pittsburg, who was not a miner, and attempted to mine with hammer and drill stringer veins of good value lying in diorite, unchanged. The expense was too great for the profit, and he failed. Had he hydraulicked the overlying bodies of saprolite and milled the quartz concentrates, success would have been the result. He put in a steam shovel, to work the rich gravel beds, but the amalgamator man got in his work, and curtailed the output to point of failure. Had he dumped his gravel into sluices, and there recovered the gold, no doubt he might have made money. The gravel is good, and there is lots of it. This plant is now idle. At Ransoms Bridge, the Halifax Placer Mining Company has just completed a plant. They have placed two 48-in. Leffel champion wheels under an 8-ft. head, coupled them to two Dean power-pumps, and are lifting 1,500 gal. a minute to an elevation of 198 ft., above 50 acres of good gravel. They have placed a 6-in. lift and two giants, and the plant is working perfectly. No clean-up has been made, but the work promises to pay.

Adjoining this property, on one side, Nova Scotia parties are prospecting for platinum on the Burt placer property. This property is a placer from which a great deal of gold has been taken, and negroes who worked it tell me that as much as 100 dwt. has been taken in a day with a rocker. The gravel pans well, and only a portion of the property has been worked, as the old-timers could not overcome the water.

Adjoining the Halifax, parties have placed a boiler and Blake pump, and are working a lift under 12 ft. of topping. The gravel is good, but, as they have just reached it, no clean-up has been made. This property lies just below and adjoining the Portis, and about half of the overburden has resulted from work with long toms and rockers, on the Portis, in olden times.

It was upon the Portis that gold was discovered, about 1840, and it was found sticking in the dobbing of a cabin on the lands. This led to research, and to the development of what has been one of the famous mines of the southern field. It is accredited with an output of near $2,000,000; practically all of which was done with slave labor, and during the war, although more or less mining has been carried on in a careless manner, even up to to-day. After the death of Portis, the original owner, the property passed into the hands of Mr. Sturgess, of Newark, N. J.; he became a victim of all sorts of new methods, and the wrecks of various patent devices lie strewn over the lands. His son, Col. W. E. Sturgess, who is still on the property, succeeded his father. Mr. Sturgess is not a miner, and although living on one of the most remarkable gold deposits within my knowledge of the southern field, the property is idle, save where a few negroes run sluice-boxes.

In early days no attention was paid to the source of the gold. First the branches were worked out, where not too deep, and later it was found that the surface was as rich as the branches had been. Carts were employed, the gravel hauled to the water, and washed. This resulted in transforming the tilled fields into bare red clay. It is still barren, and from the information I can get, two men cleaned up an average of $30,000 a year for 30 years. There are several estates in the neighborhood, said to have been bought with Portis gold.

There are, passing through this country, two saprolite dikes, which have resulted from the disintegration of white granite. It is from these that the placers have been formed. Upon the Portis, three 'tunnels,' aggregating 300 ft., have been run into these bodies of gold-bearing material, and the most of the matter washed in sluice-boxes, while the tailings still lie upon the ground. In its original condition, this mass of white material was filled with innumerable veins, ranging from mere threads to 7 ft. in thickness. When the gold-bearing pyrite contents of these veins was decomposed, the whole mass formed a network of checks, the small veins being traceable by the stains. There is not within the mass a 4-in. block of this material that does not show veins, and in some instances they will run 10 to the inch. I have repeatedly panned the material at random, and never failed to find good results, while some of the larger veins show by panning an estimated average of $20 per ton.

Report has it that one nugget of 1,200 dwt. was taken, and that at the crossings of these veins pockets have been found that ran from 300 to 1,800 dwt. Upon the Portis the two bodies of saprolite appear to be about 1,200 ft. apart, and the intervening space is the ground that produced so much surface gold. This space is also cut in all directions by gold-bearing veins, and indicates that they are feeders from one to the other bodies. I have made no assays, but have read a report, made by P. G. Lindner, who after three months' work sampling and assaying, places the ore in sight at 4,000,000 tons, worth $2.50 per ton. Undoubtedly the mass of gold-bearing matter is very great, and by hydraulicking the surface and treating the quartz concentrates by cyanide, or milling and amalgamation, great profits might result. This property is now idle.

Some three miles further on from Ransoms Bridge, the June-Alston property shows the same conditions as does the Portis. Those who have traced the white belt through the country, claim it extends for over 60 miles.

HENRY V. MAXWELL.

Ransoms Bridge, N. C., Dec. 31, 1903.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Bucket and Plunger Pump.—Suppose a bucket or lift pump with 15-in. barrel, the bucket moved by a 6 by 6-in. spear-rod working inside the rising main and having a stroke of 6 ft. Does such a pump work to any extent as a bucket and a plunger pump? If so, what portion of the work does it do on the up and down-strokes respectively?—J. S. P.

Answer.—Under the conditions you name, the lift pump would act to some extent as a bucket and plunger pump. Since the area of the spear-rod is nearly one-fifth that of the barrel in which it works, it would displace a corresponding volume of water on the down-stroke, while on the up-stroke the remainder of the water above the bucket, amounting to about four-fifths of the barrel's volume (for the 6 ft. of stroke), would be delivered. In the usual type of bucket and plunger pump the area of the plunger is one-half that of the bucket, and the volume of water delivered on the up and down-strokes is consequently equal.

Radium.—Will you inform me whether radium has been found in ores from the Urals? Can you give me the addresses of analysts capable of testing ores for that element?—G. F. H.

Answer.—Certain minerals from the Urals have been found to possess the property of radio-activity, but we are unable to say whether anyone has definitely proved that they contain radium. According to the investigations of Mme. Curie, monazite from Zlatooust, Urals, has radio-active properties. The chief source of radium at present is the mineral pitchblende from Bohemia, where it is found in the waste-heaps of one or more mines which, we believe, are no longer worked. Pitchblende occurs also in Saxony, Cornwall, Colorado and numerous other localities, but is nowhere found in large quantities. The only manufacturer of radium compounds so far as we know is the Société Centrale des Produits Chimiques, of Paris, France, and possibly you could arrange to have your ores tested there.

Coal-Dust Firing.—Can you give me some information as to the means employed in injecting coal-dust into the furnace? Could charcoal-dust be used? Kindly recommend literature on the subject; and also on charcoal furnaces with cold blast.—C. A.

Answer.—The usual apparatus for coal-dust firing consists of some form of hopper for feeding the material into the path of an air-current which carries it into the furnace. The quantity of coal-dust and air passing through the inlet pipe is regulated by slides or other devices. Sufficient air is supplied to make the combustion smokeless. This method of firing has not been introduced as yet into actual practice to any extent, and consequently the literature on the subject is not extensive. You will find, however, some information in Kent's 'Steam Boiler Economy,' and also in the issue of the JOURNAL for December 31, 1903.

With regard to charcoal iron making with coal blast, there are no recent authorities to which we can refer you. The older metallurgical works, such as Percy's, would probably be the best to consult on this matter.

Molybdenum Ore and Graphite.—Can you refer me to literature on molybdenum ore? Is the ore ever associated with graphite? Where can I have a sample of graphite, said to contain molybdenum, assayed, and could you suggest names of parties who might become interested in the development of a large and apparently rich deposit of graphite?—G. M. S.

Answer.—You will find full details as to the chemical and physical characteristics of molybdenite or molybdenum ore in Dana's 'System of Mineralogy.' For information in regard to the mining, uses, market prices, etc., consult the volumes of 'The Mineral Industry,' especially Vols. VI, VII and X.

We are not aware that molybdenite and graphite have ever been found in direct association, that is, in intercrystallized masses, but they may occur in the same rock matrix, which is likely to be a gneiss, schist, or limestone.

You can probably have your ore assayed at the Bureau of Mines in Toronto; any of the assaying firms who advertise in the columns of this paper would be perfectly competent to analyze the material. We would recommend that you employ the services of a reliable engineer to examine the property before attempting to obtain assistance in its development. In this way you would secure, at a small expense, an opinion as to the character and value of the ore, and would be in a better position to determine whether the property was worth further attention.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

"PAYING QUANTITIES" APPLIES TO OPERATING EXPENSES: NOT COST OF WELL.—Title under a lease for the production of oil and gas is contingent, and for purposes of search only, until oil and gas is found, and if not found, no estate vests in the lessee; but if found, then the right to produce becomes a vested right under the terms of the lease. Where such a lease is for a given term, and as much longer as oil and gas can be produced in paying quantities, if a well pays a profit it produces in paying quantities, though it may never repay its cost, and the operation as a whole result in loss.—Lother Oil Company v. Miller-Silbey, Oil Company (44 *Southeastern Reporter*, 433); Supreme Court of West Virginia.

CONSTRUCTION OF MISSOURI STATUTE.—The law of Missouri provides (Revised Statutes 1899, section 8820) that where one is killed a right of action accrues first to the widow and

secondly to the lineal heirs. Where a miner was killed, and the widow did not sue because she was living at time of his death with another man, and suit was brought by the children, the United States Circuit Court held that under the decisions of the Supreme Court of Missouri the children could not maintain such action, as there was a living widow; also, that as the mining law is in derogation of the common law, in such an action every necessary fact creating liability on part of the operator of the mine must be alleged, and the complaint was defective for not stating that he had "failed to keep a sufficient supply of timber, when required to be used as props," or that he had failed to "send down such props when required."—Cole v. Mayne (123 *Federal Reporter*, 836), United States Circuit Court.

CONSTRUCTION OF A DEED CONVEYING MINING CLAIMS IN COLORADO.—A company gave a bond and lease of two mining locations, the total length of which was 3,000 ft.; it had previously disposed of a strip across the claims 125 ft. wide. Its two locations conflicted with earlier valid ones, and in its application for a patent had excluded the territory thus in conflict. The bond described the property conveyed as "all of the ground and territory embraced by and belonging to . . . (it) . . . excluding and excepting the 125 by 3,000 ft., a better description of which can be found in the book of records. . . . The said territory embraced within this lease and bond is claimed and said to be 175 by 3,000 ft., . . . the locations and bounds of said property being marked and described more particularly in the location certificate or patent thereof." The court held that this was not a warranty that the property conveyed was 175 by 3,000 ft., especially where the escrow deed which the bond required to be executed, and which was executed and delivered, before the party bringing suit, as assignee, acquired his rights, only purported to convey such part of the strip as the grantor owned.—Sumpter Gold Mining Company v. Browder (73 *Pacific Reporter*, 38); Supreme Court of Colorado.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending January 19, 1904.

749,745. ROLLING MILL.—Casimir von Philp, West Bethlehem, Pa. Assignor to Bethlehem Steel Company, South Bethlehem, Pa. The combination of a rolling mill having its rolls mounted in a frame that is movable through a window in one of the side frames of the mill, and means for moving said frame and the rolls therein to and from the mill through said window.

749,747. GRADING AND DITCHING MACHINE.—Bert O. Rhodes, Barberton, O. Assignor to National Drill & Manufacturing Company, Chicago, Ill. In an elevating carrier for grading and ditching machines, the bed-frame having its upper end provided with longitudinal projecting track extensions rigid therewith; and the carrier-frame having rolls arranged to traverse said track extensions when the carrier-frame is swung independently of the bed-frame.

749,748. GRADING AND DITCHING MACHINE.—Bert O. Rhodes, Barberton, O. Assignor to National Drill & Manufacturing Company, Chicago, Ill. A wheeled body-frame provided with a plow, and an evener for a back team of horses; an evener for a forward team of horses; and a draft attachment arranged as a connection between the plow and the forward evener; the draft strain incident to the use of the plow being upon the forward evener by means of the draft attachment and the resistance of the wheeled body-frame being upon the rear evener.

749,767 and 749,768. PROCESS OF AND APPARATUS FOR PRODUCING CARBURETED AIR.—Edward F. Wilson, Chicago, Ill. Assignor to George S. Welles, Chicago, Ill. A process of producing a carbureted fluid which consists in introducing a hydrocarbon fluid and air into a sealed vessel at opposite ends, causing the same to flow continuously in opposite directions through said vessel in a zigzag direction, finely dividing said liquid throughout its passage, and simultaneously atomizing said liquid and agitating said air at one point in their passage through said vessel.

749,781. MOULD FOR BRICK MACHINES.—Harry J. Flood, Chicago, Ill. A mould composed of cross blocks; end blocks whose extremities are separately adjustable; side liner-plates; end liner-plates, one set of liner-plates abutting at their extremities against the other set of liner-plates; metallic soft backs interposed between said blocks and said liner-plates, said soft backs having flanges top and bottom flush with the inner surface of the liner-plates for preventing the vertical movement thereof; and a mortise connection between said soft backs and said cross blocks.

749,784. SUSPENSION DEVICE FOR TWO-ROPE BUCKETS.—Jed S. Foster, Westfield, N. J. Assignor to the Lidgerwood Manufacturing Company, New York. A suspension member for two-rope buckets adapted for pivoted connection with the bucket and provided with a connection for one of said ropes and a spreader guide for the other rope to maintain a considerable separation of said ropes.

749,797. PUMP ATTACHMENT.—Earle F. Kimball, Chelsea, Mass. Assignor of one-half to Charles W. Fuller, Chelsea, Mass. A fulcrum block adapted to be clamped to the frame of a pump, and a lever fulcrumed on said block and adapted to engage the piston rod of the pump whereby the position of said rod may be shifted.

749,800. HOMOLOGOUS PROPIOLIC ACID AND PROCESS OF MAKING SAME.—Charles Moureu, Paris, France. A process of producing carboxylic acids of the acetylene family, known as homologous propiolic acids of the series C_8 or C_9 by treating with carbon dioxide an alkaline compound of certain hydrocarbons.

749,803. CONVEYOR.—William J. Patterson, Pittsburg, Pa. In hoisting apparatus, the combination of a traveling crane or bridge, and a telescoping elevator carried thereby and movable along said bridge.

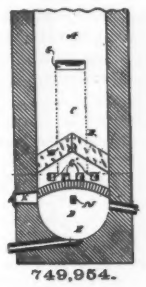
749,843. PROCESS OF EXTRACTING PRECIOUS METALS BY ELECTROLYSIS.—Henry R. Cassel, New York. A step in the process of extracting precious metals by electrolysis, which consists in lifting the pulp by an air jet, distributing the same between the electrodes and simultaneously amalgamating the cathodes.

749,844. APPARATUS FOR EXTRACTING PRECIOUS METALS BY ELECTROLYSIS.—Henry R. Cassel, New York.—An apparatus for the extraction of precious metals by electrolysis provided with a tank, vertical electrodes, a distributing pulp box, a mercury pot in the upper part of the tank, a perforated movable mercury trough, and means for lifting the pulp and mercury into said distributing box and pot, respectively.

749,925. PROCESS OF REFINING OIL.—John C. Fleming, New York, N. Y.—A process of refining and clarifying oil, in mixing a solution of borax with the oil, mingling carbon dioxide with said mass, subjecting the mixture to an atomizing aetion and finally permitting it to settle, thereby separating the objectionable elements.

749,945. PROCESS OF MANUFACTURING GAS.—Paul Naef, New York, N. Y. A process of producing gas which consists in passing a heated gas containing no nitrogen through a body of carbonaceous material to an extent sufficient only to absorb volatile matter from the fuel, and injecting steam and water into the fuel at a low level.

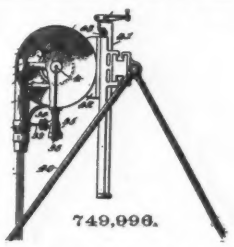
749,954. SMELTING FURNACE. — Matilda L. Trapp, Los Angeles, Cal. A smelting furnace comprising a smelting and a receiving chamber adjacent to the bottom of the stack, a grate between said chambers composed of grate-bars of suitable material properly spaced apart, the lower ends of the grate-bars resting in footing in the side walls of the stack and projecting therefrom in an upwardly inclined angle and abutting the opposite bars at the center of the stack, the receiving chamber being substantially oval-shaped at the bottom; an observation port in the wall of the said receiving chamber; a slag removing port; a metal tapping port and ports for the passage therefrom of the metal fumes, the



749,954.

said ports opening into the top of said receiving chamber and communicating with a flue extending therefrom to and into the stack above the smelting chamber, in combination with means to apply liquid fuel thereto.

749,996. POWER HAMMER AND ROCK-DRILL.—Julius Kraus, Cuyahoga Falls, O. In a hammering machine, the combination with a frame or casing,

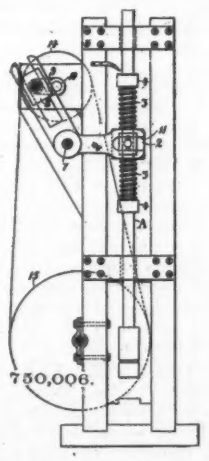


749,996.

a motor-driven pinion mounted in said machine, a gear with which said pinion meshes, one or more hammers provided with arms which are pivotally connected directly to said gear, and an anvil or the like in line with the hammers when in their outermost positions.

750,003. COAL HANDLING APPARATUS.—James M. McClellan, Everett, Mass. A framework, a carriage arranged to run lengthwise of said framework, an elevator supported upon said carriage, means for moving said carriage horizontally lengthwise of said framework, mechanism carried by said carriage to move said elevator vertically, a conveyor, a chute to convey the material raised by said elevator to said conveyor, and mechanism operated by said elevator to move said chute longitudinally of said carriage and conveyor to an operative position beneath said elevator.

750,006. STAMP MILL.—George C. Richards, Berkeley, Cal. Assignor of one-half to Herman Murphy, San Francisco, Cal.—The combination with a vertically guided and movable stamp stem, having a



750,006.

tappet slidable upon it, a lifting-stop above, and a compressible spring below and in contact with the tappet, of a rigid bell-crank lever having its angle fulcrumed at one side of the line of travel of the stem, connections between one arm of the lever and the tappet, and slidable connections between the other arm and an operating crank.

750,016. GAS APPARATUS.—Frank W. Beardsley, New York, N. Y. A gas apparatus comprising a

storage tank for containing a dense gas; a mixer comprising a hollow member and a single, gas-intake pipe, the latter arranged interiorly of said member; a valve-controlled gas delivery pipe, whereby communication is established between said tank and said intake pipe; an air current generator; and valve-controlled connections by way of which the air currents created by said generator may be conducted therefrom, to and into said mixer, the latter being situated below said tank to facilitate the escape therefrom of the contents thereof.

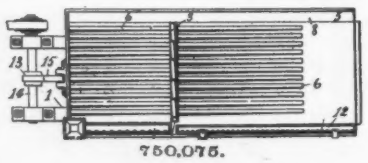
750,022. METALLURGICAL FURNACE.—William S. Dempsey, New York, N. Y.—In a metallurgical furnace the combination of a working chamber and a combustion chamber opening into the same, oppositely disposed blast pipes below and above the grate in the combustion chamber, the blast above the grate being arranged to drive the gases generated toward the working chamber and the blasts below the grate being directed angularly in an opposite direction to those above the grate, and the cross blasts within the working chamber directed from the opposite sides of said chamber and backward toward the combustion chamber.

750,034. PROCESS OF SEPARATING ZINC-BLENDE FROM ORES.—William Jamieson and Francis J. Odling, Melbourne, Victoria, Australia. In the separation of zinc-blende from ore with which it is associated, treating the ore in a pulverized state and sufficiently wet condition with chlorine, for the purpose of attacking the surface of the zinc-blende and submitting the ore so treated to a vanning motion.

750,059. BRICK MAKING MACHINE.—Walter R. Oberdahn, East McKeesport, Pa. In combination with a pug-mill, and a conveyor and clay-separating means, a wheel provided with a series of moulds loosely mounted on a shaft, means for rotating the said shaft continuously, means for rotating the said wheel intermittently, and means actuated by the shaft for ejecting the clay from the moulds.

750,071. SEPARATOR. — Dow L. Adelsperger, Springfield, O. Assignor to the Foos Manufacturing Company, Springfield, O. In a separator a series of revolving beaters, in combination with a corresponding series of concave screens, each having closed ends and lateral admission and discharge of the material operated on, said series being arranged to successively operate on said material, and means for imparting to said screens a vibratory motion transversely to the axes of revolution of the beaters and in the direction of the feed of the material.

750,075. CONCENTRATOR.—William G. Anderson, San Francisco, Cal. A concentrating table, sloping to one side and provided with means for imparting thereto a longitudinal reciprocating movement and consisting of upper and lower portions located longitudinally or endwise of each other, each portion



750,075.

sloping longitudinally downward from the feed end of the table, said portions having a transverse drop therebetween, each portion having longitudinal riffles, the riffles of the upper portion extending down to said drop, a trough at said drop for conveying the pulp to the upper side of the table, said trough having holes for distributing the pulp upon the lower portion of the table, and means for removably and selectively closing said holes, and a series of spouts inclined downward toward the upper side of the table, and discharging from the upper riffles into said trough, in combination with means for discharging the pulp upon the upper portion and water upon the lower portion.

750,093. ELECTRIC-RESISTANCE FURNACE.—Alfred H. Cowles, Cleveland, O. An electric-resistance furnace, comprising a resistance conductor in position to heat the charge, and means for passing through said conductor an electric current, the density of which increases through a portion of said conductor in proximity to the charge, and thereby heating it uniformly.

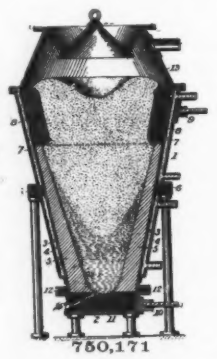
750,094. PROCESS OF SMELTING MATERIALS AND PRODUCING CARBIDE.—Alfred H. Cowles, Cleveland, O. A process of smelting materials, which consists in preheating a charge by passing hot gases through it, whereby its electrical conductivity is increased, electrically heating the preheated charge to the required temperature by an electric current passing through a resistance conductor, and increasing the heat supplied by said resistance conductor along the path of the electric current.

750,095. PROCESS OF ELECTRICALLY HEATING MATERIALS.—Alfred H. Cowles, Cleveland, O. A process of heating materials, which consists in placing the material in proximity to a resistance conductor, passing an electric current through said conductor, and increasing the current density along the path of the current, through a portion of the conductor in proximity to said material.

750,096. PROCESS OF EFFECTING CHEMICAL CHANGES.—Alfred H. Cowles, Cleveland, O. A process of producing carbides, which consists in placing the terminals of a source of electric current in contact with different parts of a body of carbide-forming materials, passing an electric current between said terminals, and increasing the current density along the path of the current in the body to a point where the heat generated by the resistance of the body causes the materials to react to form carbide.

750,170. METHOD OF ELECTRIC HEATING.—Alfred H. Cowles, Cleveland, O. A process which consists in passing an electric current through a pool of conductive material, maintaining in such a pool a region of maximum current density, feeding into contact with such pool a suitable charge, and withdrawing the product from the region of maximum current density.

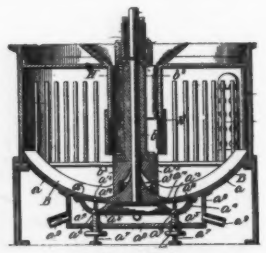
750,171. ELECTRIC FURNACE.—Alfred H. Cowles, Cleveland, O. An electric resistance furnace, comprising a hearth arranged to support a body of



750,171

conductive material, means for passing through said body an electric current the density of which increases to a maximum along the path of the current in the body, and means adjacent to the region of maximum current density for withdrawing a product by gravity.

750,224. AMALGAMATOR AND CONCENTRATOR.—John B. Rossman, St. Paul, Minn. Apparatus comprising a bowl having a curved bottom slightly rising in the center, in combination with



750,224.

rubbers centrally pivoted, extending radially and having close contact with the bottom, means for imparting a circular, oscillatory motion to the rubbers, and rods projecting above the rubbers and operating to disintegrate the material within the bowl and to break up any currents formed therein.

750,192. SAND PUMP.—Frederick G. Irvine, Marietta, O. A sand pump or bailer for wells, comprising a tubular portion having a flat face formed on its lower end at right angles to its axis, a bottom section of the same exterior diameter as the tubular portion provided with an upwardly opening valve and having a flat face at its upper end to fit against the flat face formed on the tubular portion, a hinge connecting the bottom section to the tubular portion, a longitudinal recess formed in the exterior of the tubular portion opposite the hinge, a catch arranged in the recess and secured at its upper end to the tubular portion, a longitudinal recess formed in the bottom section to receive the catch having a shoulder formed therein, and a cross recess formed in the bottom section below the shoulder.

750,194. MECHANICAL RABBLE FOR ORE ROASTING OR CALCINING FURNACES.—Alfred E. Johnson, Colorado Springs, Colo. The combination with a rabble-arm of a plow or blade loosely mounted thereon and extending downwardly on the side of the arm toward the direction of travel.

750,227. GOLD-SAVING APPARATUS. — Louis Sachse, Los Angeles, Cal. In a gold-saving apparatus, the combination with a tank having upper and lower compartments arranged one above the level of the other and having a floor between them, and communicating with each other through an opening in said floor, of means for supplying gold-carrying water to said tank vertically above said opening; means for restricting the outflow from the upper compartment; and means vertically over the opening, adapted and arranged to intercept the inflowing liquid and to direct the precipitants from such liquid through the opening into the lower compartment.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending January 2, 1904.

24,124 of 1902. ROASTING FURNACE.—W. A. Maddern, Boulder City, West Australia. Detailed improvements in furnaces for roasting telluride ores, consisting of several superimposed floors, the chief object being to simplify the gear operating the rabbles and to use the heat of the ore for heating the air supply.

26,886 of 1902. DRILL SHARPENER.—A. Purser, C. R. M. Millar and F. W. Jenkins, Johannesburg, Transvaal. Improved machine for forging and resharpening drill-bits, in which the tool is subjected to a combined pressing and hammering action.

27,189 of 1902. TREATING LEUCITE.—F. Ceribelli, Rome, Italy. A method of concentrating unaltered leucite, from which can be obtained sulphates of potassium and alum by dissolving in sulphuric acid.

184 of 1903. OIL CONCENTRATION.—A. S. Elmore, London. In the oil concentration process, arrangements for working without access of air so as to adapt the process to the treatment of tellurides and other easily oxidizing ores.

2,440 of 1903. MAKING IRON PIGMENTS.—A. Campbell, Rugeley. Using the sulphurous gases given off in calcining sulphate of iron in manufacture of iron paints, by passing them through ground iron oxide, iron scale, spent pyrites, etc.

2,612 of 1903. STEEL MAKING.—S. Parfitt, Cardiff. Adding a small percentage of aluminum instead of carbon in the manufacture of steel, so as to make a steel capable of withstanding the action of salt water.

4,514 of 1903. MINE CAR AXLE BOX.—T. Ward, J. H. Weeks and B. W. Jones, Wellington. Improved axle box for colliery wagons, so as to retain the lubricating grease longer.

13,298 of 1903. LEAD PIGMENTS.—R. Scholz, Cologne, Germany. Making a white pigment by treating litharge with sodium chloride, which results in a mixture of lead chloride, lead hydroxide and caustic soda, then adding sulphuric acid to neutralize the soda, and afterward mixing with drying fatty oils.

18,159 of 1903. FLUX FOR WELDING.—F. Todd, Newcastle-on-Tyne. Improved flux for welding steel consisting of a mixture of boracic acid, borax, iron filings, carbonate of potash, nitrate of potash, ammonium chloride and silver sand.

21,443 of 1903. ROCK DRILL REGULATOR. — Wagner Palmros Company, Fairmont, W. Va., U. S. A. In percussive rock drills, arrangements for maintaining and regulating the pressure of the steam or air.

20,758 of 1903. HARDENING ALUMINUM.—C. Sorensen, Slagelse, Denmark. Hardening aluminum so as to make it forgeable by melting it with a small proportion of potassium chloride.

22,272 of 1903. COKE RETORT.—C. E. Laurenius, Gothenberg, Sweden. Improved retorts for coking or charring peat.

SPECIAL CORRESPONDENCE.

Denver. Jan. 23.

(*From Our Special Correspondent.*)

In the case of Sherman Parker, one of the strike leaders at Cripple Creek, rearrested by the military on additional charges, after giving bonds to the amount of $19,000, an application was made to Judge Hallett, of the Federal Court, Denver, for a writ of habeas corpus, on the ground that Governor Peabody had violated amendments of the Constitution of the United States. Judge Hallett decided that the Federal Court could not interfere with the State in the due administration of its laws, and added that the people of Colorado are to be congratulated in having a Governor disposed to enforce the laws. The military, on January 20, turned Parker over to the civil authorities in Cripple Creek, to have him arraigned on a warrant charging him with harboring a murderer. Parker was at once set at liberty by the under-Sheriff, a union sympathizer, under bond of $1,500, furnished by members of the Western Federation of Miners. Parker at once escaped from the district by walking from Cripple Creek to Colorado Springs, but was arrested on his arrival in Denver and brought back by the sheriff of Teller county.

After the verdict of acquittal at Georgetown for the prisoners charged with conspiracy in blowing up the Sun & Moon transformer house, J. E. Chandler, secretary of the Idaho Springs miners' union, Foster Milburn and Ross Sanborn, members of the miners' union, were rearrested, charged with arson, on warrants sworn to by Manager Symes, of the Sun & Moon. It is now claimed that the scene of the crime is in Gilpin county, just over the line from Clear Creek county. Informations were filed in the district court, Gilpin county, against Chandler, Milburn and Sanborn, also against three miners, Carbonetti, Napoli and Seigrist. The two Italians were rearrested, but Seigrist has not been apprehended.

Citizens of Georgetown met in the courthouse recently and adopted resolutions stating that the property owners and responsible citizens of Georgetown approve all efforts that will tend to punish the parties guilty of committing the outrage at the Sun & Moon. The Citizens' Protective League of Idaho Springs has adopted resolutions endorsing the course of Governor Peabody.

Judge S. L. Carpenter, of the District Court, Denver, in the case of the people against the American Smelting & Refining Co., directed the making of an order ousting the company from its corporate franchises and privileges, until such time as it shall pay the flat tax due to the State. The attorneys of the company will appeal to the Supreme Court.

San Francisco. Jan. 20.

(*From Our Special Correspondent.*)

During the recent coast rains considerable snow has fallen in the mountains, giving hope that the coming season may not be so bad as anticipated. With abundant late rains and snow the water supply may be up to the average of late years. Miners along the Mother lode do not expect to have all the water needed for a month. Many do not like to start with a scant supply. The recent Supreme Court decision, forbidding water companies from taking away water to the injury of local residents, is far-reaching, and may in some localities affect mining interests materially.

Prospectors and mining men have located or re-located many mining claims in the different counties. In Shasta county alone about 400 location notices were recorded in the first week of January. Of course, many were claims on which the necessary assessment work for the year had not been done. Within the past ten years it has been found that claims located years before have proved more valuable than those of later record. As any prospect may be made into a mine, one of these old claims is practically as good as another for prospecting. There are plenty of opportunities of this sort in California.

The famous old Union copper mine, at Copperopolis, Calaveras county, which has been practically idle for 12 years, is about to be reopened by its owner, Fred L. Ames, Jr., of Boston. A general overhauling of the hoist and other machinery has begun. During the idleness the company has been prospecting more or less and acquiring additional ground. It now owns a strip about 6 miles long, north and south of Copperopolis. It is stated that a French company is negotiating for the property. The copper ores around Copperopolis carry no gold or silver. This mine was located in 1861, and there are some 10 or more shafts, two of which are over 500 ft. deep. At one time the property was very productive.

A new region for natural gas is at Denverton, 8 miles from Suisun, Solano county. Thus far only one well has been bored, and that for oil, reaching a depth of 1,800 ft. This now flows 125,000 cu. ft. of gas every 24 hours. An analysis shows: Carbonic acid, 0.6; oxygen, 0.2; hydrogen, 2.16; marsh gas, 92.58; nitrogen, 4.44.

Solano is one of the counties fronting on San Francisco bay. It is highly probable that the new territory will be developed the coming summer.

Strikes in the mining camps in Colorado and the cold winter in other mining regions have caused the presence in some California mining towns of a number of tramps, who are usually somewhat scarce. The miners' unions do not view their presence with pleasure.

There is labor trouble at the App mine, in Tuolumne county. Captain Nevills, the owner, wants to have his own way about employing miners, and the unions want theirs. The trouble is not yet settled. At the Keystone, Amador county, the oldest working quartz mine in the State, a number of men struck recently. The car-men and shovelers, who had been getting $2.25 per day, wanted $2.50, though most of them could not speak English. The strike was settled with no change in wages as soon as a few of the ring-leaders were discharged. At the Gladstone, at French gulch, Shasta county, which has been shut down since August, a number of men have been taken on by Superintendent Jillson. They came from Siskiyou county, where the company owns other mines. Mr. Jillson is satisfied with union hours and wages, but declines to officially recognize the union. Judge Morrow, of the Federal Court, has under advisement the case of the Royal Consolidated mines, in Calaveras county, against the striking miners.

The Karma Mining Co., near Mohave, Kern county, has been sued for $70,000 by T. J. Durand, the original discoverer and owner of the mine. When he turned it over to the company he took as remuneration $229,052 worth of stock. He now alleges that in August, 1901, the officers of the company told him a syndicate was to take the mine and levy a 25c. assessment, and that they secured his stock for $9,000, of which they kept $4,000 for commission. He now claims the whole value of his stock. The case is still pending in a Los Angeles court.

Toronto. Jan. 15.

(*From Our Special Correspondent.*)

A deputation of engineers and scientists, including Sir Sandford Fleming, T. C. Keefer, of Ottawa; Prof. Bovey, of McGill University, Montreal, and Senator Casgrain, of Montreal, waited on Clifford Sifton, Minister of the Interior at Ottawa, recently, and asked for the establishment of a Geodetic Survey in Canada. They urged that the greater portion of the Dominion is still unsurveyed and that the work would be distinctly benefited by a triangulation for the extension of surveys and the correction of those limited surveys that have already been made.

Several collections of minerals from the islands and mainlands in the neighborhood of Portland channel, Observatory inlet, Port Simpson and other areas adjoining the territory recently in dispute between the United States and Canada have been received by the Canadian Exhibition office, Ottawa. A collection from this district will form a portion of the Canadian mining exhibit at the St. Louis Exposition.

The commissioners appointed by the Dominion Government to visit Europe and investigate the smelting of iron ores and the making of steel by the use of electric processes have been further instructed to report upon plants for the manufacture of compressed peat. Erik Nystrom, assistant to Dr. Haanel, has been appointed draughtsman to the commission, which will soon leave for Europe.

The Dominion Government has received a request from the associated boards of trade of eastern British Columbia to establish a bureau of mines, into which shall be merged the existing geological survey. The proposal is not a new one. The object of the geological survey as now constituted is more scientific than industrial, and the appropriation for its maintenance is inadequate for the prosecution of the work in a measure commensurate with the growth of the mining interests. It is probable that should the outcome be the establishment of a Canadian bureau of mines, Dr. Eugene Haand, the present superintendent of mines, will be offered the position of director.

Victoria. Jan. 19.

(*From Our Special Correspondent.*)

It is expected that the meeting of the Cariboo-McKinney Co., to be held in Toronto early in February, will be intersting, as one section of shareholders is anxious to wind up the company's affairs while another favors a continuation of operations until the funds remaining in the treasury shall be exhausted. During 1903 about 15,000 tons of ore were milled, values being considerably less than $10. From 68 to 70% of the values were saved on the plates, the total recovery being from 83 to 85%. A small profit is reported on the year's operations, and the company is said to have a cash balance in hand of about $50,000, or sufficient to pay a dividend of 4% on the issued capital.

The International Coal & Coke Co. is taking out about 100 tons of coal a day from development at Coleman, Alberta.

It is proposed to install a plant at the St. Eugene, Moyie, to treat the slimes and tailings, the loss in the past being estimated at about 1½%. A building 250 ft. by 25 ft. has been erected at the lake shore, with a large settling tank on the upper floor, through which will pass all the slimes and tailings from the mill, to specially designed concentrating tables on the lower floor. It is announced two cars a day will be shipped from the North Star mine to the Nelson smelter, beginning at once.

Boundary.—A director of the Snowshoe states that the proposal to amalgamate with the British Columbia Copper Co. is received with favor by most of the larger shareholders in the Snowshoe. The company has issued a circular stating that at the two mines there has been exposed considerably over 3,000,000 tons of ore.

The Coast.—There is a considerable interest in the Wellington Colliery Co.'s anthracite coal, a seam of which is now being opened up at Comox. At Ladysmith, smelting has been resumed at the Tyee Co.'s smelter.

East Kootenay.—The Crow's Nest Pass Coal Co. made in a recent week from its collieries a record output of 21,000 tons.

Lardeau.—At the Union Jack, a claim adjoining the Silver Cup at Ferguson, 7 ft. of rich ore has been encountered in a crosscut 300 ft. long. At Poplar Creek the tunnel on the Lucky Jack is in 195 ft., and it is said a two-ft. vein of white quartz showing free gold has been found.

Slocan.—Ore shipments since the first of the year aggregate 500 tons. At the Sunset 100 tons of ore are ready for shipment and both the Reco and Ruth are shipping. The Canadian Pacific Railroad has made a reduction of $3 per ton from the former freight rates of $16 on zinc and crude ores shipped from Kootenay to Antwerp. The ore will be shipped via St. John, N. B., during the winter and via Montreal when navigation opens. Activity is becoming noticeable. At Sandon, the Alamo concentrator is to start. The Slocan Star concentrator is being remodelled, the Ivanhoe mill is being equipped to treat zinc-bearing ores, and the Payne has installed a new electric hoist. Two or three mines have been recently leased, in-

cluding the Lucky Jim, which at one time produced heavily. On the Idaho 18 in. of high-grade galena have been found in the crosscut. Work has been resumed on the Whitewater Deep. Arrangements have been made to drive a long tunnel, for 4,000 ft. on the Rambler-Cariboo. Near Kaslo, the Province mines, on the South Fork, have begun shipments.

Ymir.—Work on the Dundee begun, three shifts being now employed pumping out the mine. The second payment of $3,500 has been made on the Gold Cup, the final installment of $10,000 being due early in April. The Ymir mine's last report shows another small loss of $150, but this includes $3,500 expended in development.

London. Jan. 16.

(From Our Special Correspondent.)

The inside history of the Stratton's Independence deal gradually leaks out. For some time it has been a matter of public comment that the Venture Corporation, which floated that mine in London, had issued no regular report and accounts to its shareholders. It was surmised that the reason for this reticence was that its financial burdens in connection with Stratton's were more than it could bear. This silence has now been broken and an official statement made as to the financial position. The directors announce that the accounts are being made up to the end of 1903, and that the shareholders will be called together at an early date. They state that delay has been caused by the serious position which arose from the collapse in the value of Stratton's shares. In April, 1900, loans amounting to £650,000 had been arranged, for the purpose of buying out the balance of Mr. Stratton's interest in the mine, and in the autumn of that year, when the disclosures were made about the ore reserves, the amount of the loans still outstanding was £340,000. To have announced the state of things would have been suicidal policy, so it was decided to say nothing about it and to continue the business of promoters as if the credit of the corporation was as good as ever. Since then various successful operations have been undertaken, the most noteworthy of which was the flotation of Camp Bird, so that practically the whole of the indebtedness is now wiped out. It is proposed to amalgamate the Venture with two other corporations, the London & Continental Investment and the Mines Corporation of New Zealand, and to start afresh with reduced nominal capital. These two other corporations have been all along closely allied with the Venture, having the same directors, secretary and offices, so that there was no good reason for their separate existences. Though not agreeing on all points with the policy of the Venture, yet it is satisfactory to find it once more on its legs and freed from the millstone round its neck. The corporation expects in the future to be an important agent for the introducton of American properties in this country.

The figures for the output of the Transvaal gold mine during 1903 prove to be much more satisfactory than might have been expected after hearing so much of the tribulations of the mining magnates. In spite of shortage of labor, the output gradually increased during the year from 199,000 oz. to 286,000 oz. per month, as compared with 450,000 oz. per month before the war. It should be remembered that the output is now reported in fine ounces, instead of bullion ounces, which makes a difference in comparing the figures. Apropos of fine ounces, the adoption of a regular system of reporting output in fine gold does not make great headway in London. It is true that the Transvaal output is now reported in that way, and that the mines managed by Bewick, Moreing & Co. now report in the same way, but, otherwise, this system continues to be the exception. For instance, the Indian mines still report in bullion ounces. I should like to see John Taylor & Son, the managers of these mines, make the alteration, for they are always pointed to as models of everything that should be in connection with mining, and their example would be readily followed in this connection.

Particulars of the Esperanza Co., Mexico, are now available. It will be remembered that this ancient mine, near the El Oro, was recently acquired by the Guggenheim Exploration Co. on the advice of Mr. John Hays Hammond, and an American company was formed to work it. For the convenience of introducing the shares here, an English company, called Esperanza, Ltd., has been formed to acquire the shares of the American company, but the latter, under the presidency of Mr. Hammond, will continue to direct the operations of the mine. The shares in the English company have been allotted as fully paid to the various people who had taken shares in the American company. Of the nominal capital of £455,000, in 455,000 shares of £1 each, 232,000 shares have been allotted to the Guggenheim Exploration Co., while the remainder is distributed in smaller quantities among many influential people in England and America. Several leading houses here have interests, such as the Consolidated Mines Selection Co. and the Consolidated Gold-Fields of South Africa. It will be remembered that some four years ago the same property was introduced in London, but was never floated on account of a disagreement as to capitalization of the company. Since then the mine has been developed, and the equipment consists now of a 120-stamp mill and cyanide plant. No prospectus or report has been issued by the English company, so that information is not readily obtainable.

Sydney. Dec. 1.

(From Our Special Correspondent.)

Block 14 is erecting a plant for zinc extraction by which it is expected that 600 tons of tailings will be treated weekly.

The Victorian commissioner for patents has granted patents to the Potter & Delprat processes for the treatment of zinc tailings, but held that, as far as a master patent was concerned, both were forestalled by Elmore, the oil concentration patentee. The holders of the Potter process will appeal.

The New South Wales railway commissioners have reclassified the rates for ore carriage with a view of enabling many low grade mines to be profitably worked.

The East Greta colliery fire still continues; it is now proposed to flood the No. 2 sealed tunnel.

The Great Cobar Co. is about to erect a new water jacket furnace. All mines in Cobar field except this are now being worked for gold. The outlook for copper mining in many of the properties is very favorable.

Total exports for the 10 months are £1,159,987, a decrease of £131,525 as compared with 1902.

Lyell Blocks Co. is erecting a concentrating plant to be driven by electricity.

The Mt. Lyell Mining & Refining Co. is opening the North Lyell property so that it may yield a heavy output early next year.

The Briseis Co. during October produced 36¾ tons of black tin.

Mt. Bischoff has paid dividends amounting to £1,908,000 since commencement.

New South Wales.—Considerable consternation has been caused at Broken Hill by the South Australian railways proposing to raise its ore freights. It has been calculated that this will entail an extra annual expenditure of £12,000 to the proprietary company, and a difference of 2s. per ton in the cost of lead extracted from Broken Hill ore.

Queensland.—The No. 1 bore at Dawson river is down to 521 ft., passing through four seams of anthracite aggregating 39 ft. Another bore a quarter of a mile east, at a depth of 90 ft., passed through a solid seam 18 ft. thick. At the Bluff, 100 miles from Rockhampton, a 6-ft. seam of anthracite was found at a depth of 60 ft.

Tasmania.—Mineral exports for October include copper (blister), 603 tons, value £41,382; gold, 3,137 oz., value £11,622; silver ore, 1,408.5 tons, value £14,963; tin, 236 tons, value £26,349; silver lead bullion, 561 tons, value £19,635.

Victoria.—The gold yield for October was 77,815 oz. fine—an increase of 28,069 oz. over that for the same month of 1902. The yield for the 10 months of 1903 was 625,324 oz. fine.

The Ovens River Dredging Co.'s sluice box plant has since August 29 worked 1,407 hours for 357.5 oz. of gold.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the Engineering and Mining Journal informed of their movements and appointments.

Mr. L. D. Ricketts has gone to Globe, Arizona.

Mr. Horace V. Winchell, of Butte, is in New York.

Mr. A. A. Merlett has left London for West Africa.

Mr. D. W. Brunton left New York for Denver on January 26.

Mr. E. F. L'Engle from Durango, Mex., is in New York on business.

Mr. F. L. Bosqui is at Goldfield, Nevada, installing a cyanide plant.

Mr. Thomas H. Leggett arrived in New York by the *Cedric* on January 23.

Mr. Willis G. Moore, of Colorado Springs, Colo., is in Mexico on business.

Mr. F. Lynwood Garrison has been in New York on a visit from Tennessee.

Mr. Edwin N. Hawkins, of Denver, has been visiting New York and Philadelphia.

Mr. Wm. F. Fisher, of Bonbright & Co., London, is expected in New York shortly.

Mr. Edgar Collins is now manager of the Combination mines at Goldfield, Nevada.

Mr. George A. Wright has returned to England from the Darien mine, in Colombia.

Mr. George Hardy, Carnegie, Pa., has been examining mineral lands north of the High Hill mine, in the Virgilina, Va., district.

Mr. R. A. F. Penrose, who was in Denver a few days ago, has now returned to Philadelphia.

Mr. A. H. Reeder has resigned as general manager of the Crow's Nest Pass Coal Company.

Mr. Edward Doerr, manager of the Guggenheim Exploration Co. for Mexico, is visiting in Iowa.

Mr. H. C. Hoover sailed for London on the *Kaiser Wilhelm*, which left New York on January 26.

Mr. Robert B. Gleisberg is general manager of the Associated Mines at Kalgoorlie, Western Australia.

Mr. F. Danvers Power has been re-elected president of the Australian Institute of Mining Engineers.

Mr. Edward Hooper returned to London from British Columbia by the *Teutonic*, sailing on January 20.

Mr. Ralph Nichols, manager of the Boulder Perseverance mine at Kalgoorlie, is visiting Aurora, Illinois.

Dr. Eugene Haanel sailed by the *Lucania* on January 23 to investigate electric smelting methods in Europe.

Dr. F. L. Slocum, general manager of the Miami Mining Co., Concord, N. C., has been to New York and Boston.

Mr. Duncan McVichie, general manager of the Bingham Consolidated, left Salt Lake for New York on January 21.

Mr. H. M. Dieffenbach, of the Guggenheim Exploration Co. of Mexico, has been on a business trip to New York City.

Mr. Juan F. Brandes, who has been in New York for several weeks, has returned to the Seven Thirty mines, at Georgetown, Colorado.

Mr. C. W. Whitley, manager of the Salt Lake plants of the American Smelting & Refining Co., left Utah for New York on January 23.

Mr. J. V. Shallcross has been appointed general manager in Australia for the Australian Gold Recovery Co. His headquarters will be at Sydney.

Mr. J. Bowen Evans, engineer to the Consolidated Goldfields of New Zealand, is leaving Reefton for London via San Francisco and New York.

Mr. J. M. Callow, consulting engineer at Salt Lake City, has completed the erection of the Yampa smelter and is starting the Uncle Sam concentrator plant at Eureka.

Mr. E. A. Tays has been appointed manager of the Maconi-Doctor mines, in Queretaro, Mex., in the interest of the United Mining & Development Co., of New York.

Mr. Augustus B. Sanders, formerly with the Electric Storage Battery Co., of Philadelphia, Pa., has accepted a position with Mr. John B. Watson, agent for railway equipment at Philadelphia.

Mr. C. Ferland, of Newcastle-on-Tyne, England, consulting engineer for the Monitor Co., Sandon, B. C., is expected at the mine shortly to determine the advisability of erecting a concentrator.

Mr. Edward Everett, civil engineer, who has specialized in railroad work and who made the survey for one of the Hudson river tunnels, has become associated with the Engineering Co. of America in New York.

Mr. H. C. Richle, of the Union asbestos mines, Black Lake, Canada, passed through London recently on his way to Hamburg on business. He expects to be back in Canada some time in February.

Mr. D. E. McPherson, of Deadwood, S. D., left New York recently for London on his way to the gold coast of West Africa, under contract for three years as assistant manager of the Ashanti Gold-field Corporation.

Mr. Charles Trezona has been appointed superintendent of the Chandler mine at Ely and of the Minnesota property at Soudan, Vermilion range, Mich., and will also retain the superintendency of the Pioneer mine.

Mr. Frank E. Fielding, chief assayer at the Consolidated California & Virginia office at Virginia City, Nev., for 30 years, has tendered his resignation, to take effect February 1. Failing health and a desire to live in Los Angeles are the causes assigned for his retirement.

Mr. J. Edward Swanker, manager of the Empire Bridge Co., the Albany department of the American Bridge Co., is to sail for England, on February 1, to take charge of the Teeside Bridge & Engineering Works, Ltd., of Middleborough, of which Sir Christopher Furness is president.

Mr. Justice Britton and Mr. B. T. A. Bell, the members of the Yukon Hydraulic Commission, appointed by the Canadian Government, are now engaged in preparing their report, having finished the taking of testimony. Mr. John E. Hardman, of Montreal, and Mr. John B. Hobson, of Bullion, B. C., are consulting engineers to the commission.

Mr. B. F. Brush, the present general manager of the Consolidated Coal Co., of St. Louis, was born at Wellsboro, Pa., in 1859. He became connected with the coal industry in 1889, when he took the position of general superintendent of the Oregon Improvement Co., which owns coal properties on the Pacific coast. In 1896 he resigned to accept the position of general manager of the Northern Pacific coal properties. Mr. Brush resigned from this position in February, 1903, and went to St. Louis to become vice-president and general manager of the Western Coal & Mining Co. and general fuel agent of the Missouri Pacific properties.

OBITUARY.

Dr. Francis W. Harrell, formerly a surgeon in the United States Army and for years a resident of Japan, died of pneumonia at the Waldorf-Astoria, New York, on January 19. He was manager of the La Fortuna Mining Co., operating the La Fortuna mines in the State of Jalisco, Mex.

Selwyn M. Taylor, who lost his life in a heroic attempt to rescue the men entombed by the explosion at the Harwick mines, near Cheswick, Pa., on January 26, was widely known both as a mining engineer and as an official of various coal mining companies. He was a man of means, and at the time of his death had planned to take a yachting trip in Florida waters. Mr. Taylor was for a time consulting engineer of the West Side Belt Railroad Co., and was president of the National Coal & Coke Co. With M. K. Salsbury, he organized the Midland Coal Co., which was sold to the Pittsburg Coal Co. some time ago. He was 47 years of age, and leaves a widow.

Whitaker Wright, once a man of importance in the financial world, whose operations in Western Australia and British Columbia mines, brought about his ruin and wrecked his reputation, took poison in London on January 27 after he had been sentenced by Justice Bingham, of the Kings Bench Division of the High Court of Justice to seven years' penal servitude for fraudulent practice as manager and director of the London & Globe Finance Corporation. Mr. Wright, according to his own story, was born in Cheshire, England, in 1846, and came to this country at the age of 21, went West and was one of the pioneers at Leadville. He made and lost much money in mining ventures, and later settled in Philadelphia, where he became a promoter of all kinds of schemes. The panic of 1893 ruined many of his projects, and he went to Australia, when the gold excitement was high, and organized the Western Australia Exploration Co. in 1894. Thenceforth his career was spectacular. The Lake View mine and other purchases proved extremely profitable. He had no difficulty in floating new companies, and in 1895 he organized the London & Globe Finance Corporation, which, in 1897, took over other flotations, and issued shares to the value of £16,000,000. Shortly after he organized the British America Corporation. For a few years Wright lived in the greatest luxury, but the crash came with the fall in the value of all securities on account of the Boer war. This was in Christmas week, 1900. Some members of the English nobility were involved. As a result of the subsequent bankruptcy proceeding criminal action was brought against Mr. Wright in 1902.

SOCIETY AND TECHNICAL SCHOOLS.

LAFAYETTE COLLEGE.—The Henry W. Oliver chemical and metallurgical library of this college, Easton, Penn., has received as a gift from a generous friend all the pamphlets, about 3,000 in number, belonging to the library of the late Prof. Johannes Wislicenus, of the University of Leipsic. Prof. Wislicenus, who was a famous chemist, was a pioneer in the study of lactic acids and led in the work which gave the present knowledge of stereoisomerism. This library represents the collection of 50 years of great activity and will be a valuable addition to the Oliver library.

INDUSTRIAL.

The great power plant of the Pike's Peak Hydro-Electric Co., at Manitou, Colo., will be in operation within six weeks.

The tipple and coal washer erected by the Sloss-Sheffield Steel & Iron Co., at Blossburg, Ala., was burned recently, entailing a loss of $30,000.

The Railway & Electric Equipment Co., of Philadelphia, Buffalo and Chicago, has withdrawn its Cleveland office and now has no representative at that point.

The Wellman-Seaver-Morgan Co., of Cleveland, O., announces the opening of a Pittsburg office, in the Frick building, in charge of Willard N. Sawyer, for the convenience of the trade adjacent to Pittsburg.

The Middletown, Pa., car works will resume operations in full about February 1. The company has booked an order for cars for the Berwind White Coal Co. of a pattern designed by Arthur King, of the Middletown plant.

The Dominion Dump Car Co., of Ottawa, Ont., has been incorporated with a capital of $2,500,000, to construct cars for railways, tramways, etc. The provisional directors include H. S. Hart, S. Otis, T. F. Sheridan, of Chicago, Ill., and James Forman, of Ottawa.

The firm of Mallory, Hulaniski & Burt has been dissolved by mutual consent, F. J. Hulaniski retiring. The business in bonds, investments, mines and mining will be continued by the remaining partners under the style of Mallory & Burt, at 79 Wall street, New York City.

Two cable lines, one 8 km. long, from the Cigarero mine, near Jiminez, State of Chihuahua, to Baca Station, on the Central railway, and the other 300 ft., at the Guarisama mine, near San Dimas, in the State of Durango, have been installed by Enrique de Penaloza, representing the A. Leschen & Sons' Rope Co., of St. Louis, Missouri.

The Crucible Steel Co. of America petitioned the United States Court to appoint a receiver for the Clairton Steel Co., and Judge Buffington appointed the Union Trust Co., of Pittsburg, and William G. Park, as receivers of the Clairton Steel Co. The receivers have already given instructions for the continued operation of the plants of the company. This action was taken to secure money loaned to the Clairton company.

The American Bridge Co., New York, has secured a contract for structural material for the huge reduction plant of the Cerro de Pasco Mining Co., at Cerro de Pasco, Peru. Somewhat more than 1,000 tons of steel will be employed. Frank Kleptko, of New York, is acting as consulting engineer. Contracts are expected to be placed within the next 30 days for further equipment for the plant. The Nordberg Manufacturing Co., of Milwaukee, Wis., some months ago secured the contract for the engines. The blowers will be of Roots build. Considerable electrical equipment will be ordered.

Westinghouse, Church, Kerr & Co., New York, have received an order from the Manila Construction Co., of Manila, P. I., for a complete power equipment for the city traction system. The order comprises the following machinery: Three 750-kw. Westinghouse turbo-generator units, two compound engine exciter units, one motor driven by exciter unit, three 50-kw. rotary converters, one 300-kw. rotary converter, four 250-kw. oil-insulated transformers, complete switchboard, one series booster. The first turbo-generator unit will be delivered in about nine months. The turbine will operate at 150 lb. steam, 26 to 27 in. vacuum and 150° superheat. It is fitted with the usual by-pass for securing an overload capacity of 50%. The turbine machinery will also furnish current to the local light and power system.

The B. C. Riblet aerial tramway, it is reported, was constructed during 1903, or is in course of construction now, at the following locations. For Ophir-Lode Mining Syndicate, Oyster-Criterion tram, Camborne, B. C., 4,500 ft. capacity each 10 hours, 150 tons; Calumet & British Columbia Gold Mines, Ltd., Eva tram, Camborne, 7,500 ft., capacity 100 tons; Silver Cup Mines, Ltd., Silver Cup tram No. 2, 17,500 ft., and No. 4, 2,500 ft., each 150 tons capacity, and both connected with the mine near Ferguson; Great Western Mines, Ltd., Alamo, Alamo No. 1 tram, 2,000 ft., capacity 100 tons, and Alamo No. 2, 8,500 ft. capacity 150 tons; Minnesota Silver Co., Ivanhoe tram, near Sandon, 1,200 ft., capacity 150 tons; British Columbia Standard Mining Co., Hunter V. tram, near Ymir, 13,000 ft., capacity 200 tons; Tyee Copper Co., Tyee tram, Duncans, Vancouver Island, 17,500 ft., capacity 300 tons; two trams in Idaho, of 12,000 and 8,000 ft., respectively, and one at Encampment, Wyo., of 1,000 ft., and a capacity of 900 tons. The buckets and other metal equipment for these trams, except the 80 miles of wire cable needed were manufactured at Nelson, B. C., the headquarters of the company.

TRADE CATALOGUES.

The Union Steam Pump Co., of Battle Creek, Mich., has published an 8-page folder entitled "Hints on Modern Steam Heating," which describes the vacuum system of steam heating.

Cincinnati air and gas compressors is the subject of pamphlet L 26—A, recently issued by the Laidlaw-Dunn-Gordon Co., of New York City. The pamphlet is of pocket size, and will be sent upon request to those interested.

The Buffalo Steam Co., of Buffalo, N. Y., in a four-page folder, gives illustrations of a 1,000-gal. underwriter fire pump, 18 by 10 by 12, and a boiler feed pump, 6 by 4 by 6. A short but comprehensive description is given of each of the pumps.

A supplement to catalogue No. 77 has recently been published by Arthur Koppel, manufacturer of narrow-gauge railway material, New York City. It contains 11 pages, 8 by 10 in., and gives some further information bearing on track materials, mainly switches and turntables. A few new types of cars, built by the firm, are also shown.

The Brown Hoisting Machinery Co., of Cleveland, O., has issued a catalogue under the title of Ferroinclave, by which the company aims to bring to notice of those interested a new corrugated steel and cement fireproof construction of that name, for roofing, siding, flooring, etc., the invention of Mr. A. E. Brown, vice-president of the company. After the ferroinclave sheets are placed, the outside is coated with a mixture of sand and Portland cement, filling up the corrugations ⅜ in. above the top. The under side is coated to the same depth with another mixture of Portland cement, mixed with hair, to secure the proper adhesion. Figures giving results of weight tests are contained in the catalogue.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

(From Our Special Correspondent.)

The capitalization of four big allied companies is as follows: Calumet & Arizona, issued $2,000,000; authorized, $2,500,000; Calumet & Pittsburg, issued, $2,000,000; authorized, $2,500,000; Lake Superior & Pittsburg, $400,000; Pittsburg & Duluth, $500,000. These figures represent a cash investment, in some cases already made, in others partly made and partly soon due. None but the first is beyond the exploratory stage, and the three are still more or less uncertain. It is largely due to the knowledge and skill of Thomas F. Cole, of Duluth, that these various properties have been gathered into such an important group as they are. Had the Mag shaft stopped anywhere from 500 to 700 ft. down, the Bisbee district would still be a single-mine camp.

Now, in addition to the properties above referred to much other Michigan and eastern money is in the district. Higgins, Wolverine & Arizona, Calumet & Cochise, Calumet & Bisbee, Houghton Development, Copper Glance, and a score of others, are sinking shafts and exploring for copper. It is a fact that not one of these companies has yet demonstrated its value. Their explorations are costing millions of dollars, and with few exceptions the money has been supplied quietly by upper Michigan and northern Minnesota men. Stock ownership in Calumet & Arizona and its associated properties is, broadly speaking held one-half at Pittsburg, one-quarter at Duluth and one-quarter in the Michigan copper country. It is proposed to concentrate management at Duluth when practicable.

Lake Superior & Pittsburg.—This Company has the same officers and stockholders as the Calumet & Arizona and Calumet & Pittsburg. It has two shafts 2,500 ft. apart. Its north, or Cole, shaft is 1,100 ft. deep, and on the 1,000-ft. level drifts have cut 110 ft. of ore, said to average 20% copper, and better than $6 gold and silver. Other encouraging indications have been found.

Pittsburg & Duluth. — Calumet & Arizona workings westerly and Lake Superior and Pittsburg north drifts are in or near ground of this company, having nearly the same stockholders as the others. The indications are favorable and the Congdon shaft is believed to be very close to good ore.

MOHAVE COUNTY.

Leland.—The 40-stamp mill on this property, near Kingman, was started recently and found satisfactory. From 40 to 50 tons of ore are hauled to the mill daily and when the new locomotives arrive, from 150 to 200 will be hauled.

PINAL COUNTY.

(From Our Special Correspondent.)

Mammoth-Collins.—This large gold property, at Shultz, some miles north of Oracle, which has been closed by litigation for two years past, will, it is said, soon be reopened and worked. It is to be resold by the sheriff at Florence February 1, there having been an error in the first sale. The mill of 70 stamps is at Mammoth, on the banks of the San Pedro river, six miles east, where there is an abundance of water. The property was formerly under the management of George P. Blair.

YAVAPAI COUNTY.

Black Rock Mining Co.—A force of mechanics is at work near Constellation erecting cottages, stock bins, etc. The excavations for the mill are completed.

Cleopatra Mining Co.—This company, of Jerome, it is reported, G. W. Hull manager, is to rebuild its power-house, recently destroyed by fire.

Dividend Mining Co.—This property, which adjoins the Leland, is installing a new hoist with a capacity of 1,000 feet.

Stark Mining Co.—This company, operating the Hidden Treasure mine, has put in a new hoist and a 10-stamp mill.

United Verde.—In the smelter two 200-ton and one 250-ton jackets are turning out bullion to their full capacity. The second of the two 500-ton furnaces was blown in recently and worked all right. This furnace was rebuilt from the foundation up.

CALIFORNIA.

AMADOR COUNTY.

Argonaut Mining Co.—The shaft of this mine at Jackson has been unwatered below the 1,600-ft. level, and a station is being cut.

Central Eureka.—At this mine, Sutter creek, W. R. Thomas manager, a large number of men are employed keeping the mill running steadily.

Keystone Consolidated Mining Co.—This company at Amador City, Edward Lynch manager, is to remodel the crushing plant. Large skips have recently been put in, and a new Dow pump is being installed. There are two mills, one of 40 and the other of 20 stamps. Heavier stamps are to be used for the 40-stamp mill.

New York.—At this mine, Railroad flat, 30 men are doing development.

Oneida Mining Co.—A new Aldrich pump, capacity 200 gal. a minute from 2,400 ft., is to be installed on this property at Jackson, E. Hampton, superintendent. A winze is being sunk to the 2,200-ft. level. The mine is making a steady output of low-grade ore.

Pine.—This old mine in Pioneer district is being reopened by a San Francisco company and a tunnel run from the West Point bridge.

South Eureka.—The labor troubles have been settled at this mine, Sutter creek, and work resumed on the 2,000 and 2,300 ft. levels.

Western Mining Co.—This company, owning the Baliol mine, at Sutter creek, has decided to sell its 40-stamp mill, hoist, compressor plant, etc. The mine was closed down some time ago as the ore did not pay.

BUTTE COUNTY.

Alex. Brown, of Milton, has obtained an option on 1,200 acres of ground near Bangor, which he has transferred to Wm. J. Gagze. Preparations have begun to work it on an extensive scale. A bed-rock tunnel is to be run to drain the ground.

EL DORADO COUNTY.

Rattlesnake.—The tailings and sulphurets are treated at the cyanide plant of the Rosencranz mine, and run from $20 to $25 per ton. It is thought mining will be resumed and the ore treated by cyanide.

Highland Gold & Copper Co.—This company has acquired the Holmes mine, near Georgetown. Oregon cañon, a very productive piece of ground in coarse gold, runs lengthwise through the property.

Santa Claus.—This company, near Greenwood, is installing a new hoist.

FRESNO COUNTY.

Coalinga Oil Field.—The 200,000 bbl. oil reservoir for the Southern Pacific Co. is to be built on contract. The railroad already has tankage capacity of 120,000 barrels in the field and at Ora station. The well of the Caribou Co. is yielding at the rate of 400 bbl. daily of a 23° gravity oil. The Union Oil Co. is pumping a well which produces 600 bbl. daily.

KERN COUNTY.

Kinyon.—This mill at Randsburg has started up under management of C. H. Snow.

Pinmore.—This mill at Johannesberg, recently destroyed by fire, has been rebuilt and is again busy.

Sand Cañon.—McKay & Stutch have sold this mine at Amalie to R. W. Gorrill for a stated price of $10,000. The mine is a producer.

MARIPOSA COUNTY.

Malone.—This property, 6 miles from Mariposa, owned by the Bear Creek Mining Co., is having a new shaft sunk in new ground. The buildings and machinery of the Horseshoe mine, in Hunters valley, have been moved to the Malone.

Sweetwater Mining Co.—At this property, near Jerseydale, T. W. Jones superintendent, 20 miners are at work and a 5-stamp mill is in operation. The buildings are being enlarged.

NEVADA COUNTY.

Brunswick.—An electric pump is being installed in this mine at Grass valley by Chris Mallen, superintendent. There are eight pumps in the mine, two being electric.

Canfield.—The mill at this mine, Blue Tent, is ready for work, and the main tunnel has been run under the gravel channel.

El Oro.—While sinking the shaft on Yuba No. 3 of this group at Maybert good ore was struck, and work will be continued.

Green Mountain.—An upraise has been started from the 800-ft. level, and sinking from the surface is in progress. A hoist is to be put up when the shaft is finished; also a mill.

Lamarque and Inkerman.—These claims, near the North Star, Grass valley, under bond to F. R. Wehe, are now controlled by Rosenfeld's Sons, of San Francisco. A deep vertical shaft will be sunk at once.

Liberty Hill.—This property, Wm. A. Maguire superintendent, has received permission from the debris commission to construct restraining dams in Bear river and Stump canyon and work will start at once. It has been idle some years because the owners were unable to obtain a permit to hydraulic.

Murchie Mining Co.—A. Maltman, superintendent of this mine, at Nevada City, is preparing to resume underground work. The new machinery is under cover. The ore bins have a capacity of 1,500 tons, and the new 20-stamp mill will be kept going.

North Star Mines.—At the Central shaft of this property in Grass valley, some exceedingly rich ore has been found on the 3,700-ft. level. A cyanide plant, it is reported, will be erected on the Loutzenheiser ranch.

Omega Mining Co.—The big restraining dam for debris, on Scotchman's creek is practically completed. It is of stone and earth and well cribbed. As soon as the dam is officially inspected hydraulicking will begin.

Spanish Ridge.—In this mine at Washington (formerly known as the Sixteen-to-One), 16 men are now employed, and the mill will soon be started.

Wyoming.—At this mine the tributers recently uncovered a ledge of fine ore and are doing well.

RIVERSIDE COUNTY.

Chuckawala Mining Co.—This company at Salton, E. V. Bray manager, has recently made a satisfactory test run, and will now build a mill.

Ora Copia Mining Co.—This company, 15 miles from Salton, G. L. A. Richter superintendent, is erecting a 100-ton reduction plant, water for which will be pumped five miles.

SAN DIEGO COUNTY.

The three garnet claims owned by M. M. Moulton, of San Diego, at De Luz, have been sold to S. N. Eichbaum and N. T. Harris, of San Francisco, who will develop them.

Encinitas Copper Co.—The concentrating plant, 35 miles from San Diego, has been started. The product will be shipped to the smelters.

TEHAMA COUNTY.

About six miles from Paskenta Samuel Reese has found a ledge of gold-bearing ore, on the north side of Thomas creek. It is supposed that the ledge found was the one which fed the creek with gold and about 30 claims have been staked out.

TUOLUMNE COUNTY.

Arbona.—This mine has been idle a year, but, it is reported, will shortly start again.

Bell.—Ground has been broken for the foundations of the new 20-stamp mill at this mine, near Carters.

Golden Era.—The stamps have commenced dropping at this mine. In the cross-cut on the 500-ft. level an 8-ft. vein of good milling ore has been found.

Horseshoe Bend.—At this mine a compressor plant is to be put in and power drills used.

YUBA COUNTY.

Cranston Mining Co.—This company, which recently bought the Beeny place, on the south side of the Yuba river, six miles from Marysville, has a bond on 240 acres owned by John Reynolds and W. Norton. The company now has a 2-mile strip of dredging ground near the levee and channel of the Yuba river.

COLORADO.

CLEAR CREEK COUNTY.

Brighton.—This mine, at Freeland, resumed operations under the management of David Ellis. The property is owned by the Pittsburg Consolidated Co. The shaft is down about 300 ft., and sinking is to be resumed as soon as a pump is installed. The Brighton is an extension of the Gum Tree.

Clear Creek Dredging Co.—A prospectus states that this company, to be formed with $300,000 of preferred stock and $300,000 of deferred, par value of each $100, is to work 200 acres of dredging ground which by tests is said to show 10c. to 50c. per cu. yd, at surface and $2 to $6 on bedrock. The prospectus puts the average value of the ground at 75c. per cu. yd. and the average depth of ground at 30 ft. The first season but one dredge may be put at work. It is estimated that two dredges will exhaust 20 acres annually, and that 10½ years will be required to exhaust the 200 acres. The assumed net profits are 37c. per cu. yd. It is intended that preferred shares shall be preferred to the extent of 30% per annum, the deferred shares to receive 30%, and the remainder to be divided equally between the two classes of stock. The prospectus is issued by W. P. Bonbright & Co.

Dives-Pelican and Seven-Thirty.—These groups, on Brown mountain, near Silver Plume, are reported sold to a syndicate of New York and Kentucky men for $500,000. The properties will be turned over to the new owners on February 1, at which time all leases will be cancelled. R. C. Vidler, manager of the Trans-Continental Transportation Mining & Milling Co., brought about the deal, and J. H. Robeson, a large owner, is expected to be manager.

Lebanon.—John Owen, of Idaho Sprngs, has acquired this property on Republican mountain, near Georgetown.

Stevens.—The new 50-ton concentrating mill, recently erected by the Waldorf Mining & Milling Co. at this mine, was started recently and found satisfactory. The crusher and rolls are fed automatically, requiring two men on a shift to handle the ore. Card tables are used. The company intends to ship 10 tons of concentrates a day, and surveys for an electric railway to connect the mine with Silver Plume have been made. This work will not be started until spring. Pumps are being installed, and when the mine is drained development work will be resumed.

Vulcan.—This old producer, on Republican mountain, near Georgetown, is worked by C. I. Burt. Two sets of leasers are busy. The ore is said to carry 29% zinc, 7% lead, and 150 oz. silver per ton.

CHAFFEE COUNTY.

Latchaw.—A contract for 1,500 ft. of work has been let for this mine on Mount Princeton.

Mary Murphy.—This mine at Romley is shipping 50 tons daily and working 30 men.

Woods Gold Mining Co.—The mill is completed and will begin operation in the spring. A large body of ore is reported opened recently.

FREMONT COUNTY.

Metallic.—Fire destroyed this mill and other buildings, near Florence, January 21, owned by the United States Reduction & Refining Co., causing a loss between $75,000 and $200,000, with no insurance. The mill was closed about three years ago on account of the 300 men asking for shorter hours and increased wages, which were refused. It was being dismantled and the best of the machinery shipped to Utah to be used in a new mill which the company is constructing there. The origin of the fire is unknown.

United States Mica Co.—This property at Micanite, it is reported, is to have a crushing plant shortly. R. W. Mink is general manager.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

Gilpin & Coaley.—This group has been secured by a local pool under a lease, it being situated up Silver gulch in the Enterprise district, and was among the richest silver mines in the county. The pool will work through the Manhaska tunnel.

Ingalls Gold Mining & Leasing Co.—In the group of mines on Gunnell hill in the Eureka district, the Straub shaft has been sunk 515 ft. and is to be continued 200 ft. deeper. The company intends to expend about $10,000 for top equipment and additional buildings, the new plant to consist of a 14 by 16-hoist, two 80-h. p. boilers and a 3-drill air compressor. Regular shipments have been kept up some time and the ores are of satisfactory grade. W. Ballantyne, Central City, is manager.

Meritoria Gold Mining Co.—This company has been organized to operate under lease and bond the Hunky Dora property in Gregory district, under the management of J. C. Fleschhutz, Central City. The machinery has been put in shape, also the top buildings.

Mountain Monarch Mining Co.—Iowa men have taken a lease and bond on the Colorado-Maurer group on Gold Dirt hill. They propose to extend the tunnel workings to tap the shaft workings. Frank Augustus, Rollinsville, Colo., is manager.

Stacy.—This group of seven claims, in the south Boulder district, has been purchased by Rollinsville parties, who will organize a company for further operations. Development work has been commenced. G. E. Churchill, Rollinsville, will be in charge as manager.

Vanderbilt.—Denver men have a lease and bond on the five claims in this group, south of Central City, and will install machinery on the Pride shaft, which has produced good grade ore, and sink it deeper. E. P. Young, Central City, is manager.

GUNNISON COUNTY.

Bowerman-Dunn.—A. E. Reynolds is reported to have bought this property at Bowerman, and the Independent Gold Mining Co. has been incorporated by Stephen Dunn, John C. Bowerman, A. E. Reynolds and W. J. Fine to take it over with $1,000,000 capital stock. Men are reported at work and machinery will be added at once.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

The daily production now averages about 2,400 tons of all classes of material.

Banker Mining & Milling Co.—Wm. E. Guth, secretary, has sent out notices from the New York offices calling a meeting in Leadville on January 30 to consider the issue of $75,000 mortgage bonds. An immense amount of work has been done, but only low-grade ore so far has been found. New York people are interested.

Blake Group.—Lessees are working this claim adjoining the London mine. In sinking the new shaft they have opened a 34-ft. vein of sulphide showing a 5-in pay streak running high in gold and silver.

Hedberg.—This is a new property in the Horseshoe section. The lessees have uncovered a rich lead material as well as large quantities of free milling ore.

Huckleberry.—A large body of good grade silver ore is reported opened up and the first shipments are now in the hands of the smelter.

Last Chance.—The mill is making a very satisfactory concentrate from the ore.

Little Louise.—Manager Linderman has opened large bodies of milling ore and a mill will likely be built in the spring.

Midas Mining Co.—This company is handling a large water flow from the Coronado shaft, developing and prospecting on large iron bodies, and handling 250 tons a day of fair grade mineral from the Midas and Coronado shafts.

New Emmet Mines Co.—Nos. 5 and 7 shafts, worked by lessees, are shipping a fair grade iron oxide and doing considerable prospecting.

Ollie Reed.—No information is given out by the management, but it is known that there is a fine gold ore shoot producing some very rich mineral. It is learned that dividends are being paid.

Peerless Maud.—The Peerless and Peerless Maud and Lost Strip claims are all shipping a good lead material. The milling ore is handled by the Last Chance mill.

Wild Cat.—A new shaft house and other surface improvements are almost completed.

OURAY COUNTY.

Camp Bird.—A 1,500-ft. shaft is being sunk on the Camp Bird vein to prove the ores at depth, and if found continuous it is said a 14,000-ft. tunnel will be driven from the mill to cut and drain it from the bottom, doing away with the long aerial tram and bringing the ores out at the mill. A new compressor and a double-decked cage, to carry 16 men, will be installed immediately. If the long tunnel is driven an electric power and light plant will be put in at Ouray. At present power and light are transmitted from Ames, on the Telluride side of the range. The men employed now number 225, and 50 more will be added within the next two weeks.

Governor.—This mine, near Ouray, has gold and silver ores blocked out, and a mill will be erected the coming spring.

Ouray Smelter.—This plant, which has been buying low-grade ores from the small mines for three months, will blow in about April 1.

SAN JUAN COUNTY.

Oversight.—John H. Dreyer leased and bonded from J. C. Clevenger this group, in the upper Mineral creek district, near Silverton. The veins, which are developed to a depth of 130 ft., show ore running from 130 to 250 oz. silver and up to 1 oz. gold. The consideration called for in the bond and lease is $10,000, extending over two years. Operations will commence at once.

Green Mountain Mining & Milling Co.—The new machinery of this company, in Cunningham gulch, near Silverton, was installed and started recently. The compressor can supply 10 drills if necessary. On the Ocela vein, 19 ft. wide, 200 ft. of drifting has been done. Work on the main crosscut has been suspended awaiting a Rand drill.

(*From Our Special Correspondent.*)

San Juan Smelting & Refining Co.—This company, of Silverton, has completed its aerial

tramway, enabling it to transport ore beyond the capacity of the smelter. Instead of the usual pyramid-shaped towers, square ones are used. A large quantity of ore is now at the smelter and if it had not been for the coal miners' strike, the company would have started the works on the completion of the tramway. The Henrietta is the principal property. F. C. Kendrick is manager, and E. W. Walter is metallurgist at the smelter.

SAN MIGUEL COUNTY.

(From Our Special Correspondent.)

The most important feature of the underground work is the Stillwell tunnel, which will intersect veins at the depth of 900 ft. below the lowest of the upepr workings.

During the summer the tunnel was driven only 400 ft., but an air compressor is now installed. When completed the tunnel will be 2,600 ft. long, and Manager Charles A. Chase expects to have it completed within 18 months. The mill running at full capacity will treat about 300 tons of ore daily.

Since martial law was declared much has been accomplished in eradicating the agitators. Guy E. Miller, president of the local miners' union; J. C. Williams, vice-president of the Western Federation of Miners, and 63 others, all prominent in union circles, have been deported to another county with instructions not to return while the military have control. Every week some men are sent out, and all are stopping at Montrose, where a lodging and boarding house has been established by the union. It is said that the men will remain at that place until the soldiers are withdrawn and then return.

All the properties that were tied up by the strike last September are either running at full or part capacity. A few men are arriving each night, though the influx is not great, as the mine managers have instructed their agents in Denver and other places not to hire men without first explaining the exact conditions under which they would be compelled to work, and to secure only good miners. There is any amount of unskilled laborers in the county, but a good quartz miner can secure a position at any mine in the district.

Ella Gold Mines Co.—This company operating the Nellie mine, in Bear Creek basin, was seriously handicapped by the strike, and besides had its tramway completely wrecked last winter by snow slides, which caused the mill to be shut down for weeks. Notwithstanding these delays, the total output of the mine for the six months that the mill was in partial operation in 1903, was about $60,000. The mill treated 7,033 tons of ore, with values almost entirely gold. The cost of mining, milling and development work per ton was $7.64. About 2,000 ft. of development work was done.

Japan Mines Co.—A mill and tramway from mine to mill, near Telluride, it is reported, will be built in the spring.

Liberty Bell.—The returns for 1903 are: 20,831 oz. of gold-silver bullion and 39,696 oz. of silver-gold bullion, the former secured by amalgamation and the latter by cyanidation. The milling plant is divided into three different divisions, viz.: the concentrating and amalgamating mill, the cyanide works and the canvas tables, where the tailings from the mill proper and the cyanide plant are treated. The company is probably the best equipped milling plant in Colorado. During the nine months the mill was in operation it treated 61,304 tons of ore, which yielded besides the amalgam mentioned 1,253 tons of concentrates, and 480 tons of concentrates saved from the canvass plant. The Liberty Bell ore is free milling. About 2,000 ft. of drifting was done during the year.

TELLER COUNTY—CRIPPLE CREEK.

Stratton's Independence.—A frightful accident occurred at this mine on January 26. A gang of 15 men were being hoisted up the 1,500-ft. shaft. Something went wrong, and the cage rushed to the top of the headframe, striking the heavy beams and breaking the cable. The cage then fell to the bottom of the shaft. Two of the men managed to grasp iron bars at the top, but one was crushed and the other badly injured. The bodies of the men who fell to the bottom were horribly mutilated.

There is a strong suspicion that some one connected with the Western Federation of Miners may be responsible. Some time ago an engineer allowed the engine to overwind, but, fortunately, no men were on the cage. The militia now has charge of the mine, the engineer is under arest, and a rigid investigation will be made.

(From Our Special Correspondent.)

Matoa Co.—A strike is reported on the 200-ft. level of the Half Moon claim on Gold Hill. Reported assays run from 3 to 10 oz. per ton.

Rio Grande Sampler.—This plant, in Victor, is treating 150 tons of ore per day. One shift of 16 men is now employed, but February 1 another shift will be put on. All samplers are working a full compliment of men.

Trilby.—New machinery will be installed by the Bayard Mining and Milling Co. capable of sinking 1,000 ft. The shaft is now 500 ft. deep, and the lessees are breaking ore on the 425-ft. and 500-ft levels, which is giving smelter grade returns. The ore shoots are from 3 to 4 ft. wide, and the lessees ship from 2 to 3 cars per week. The output will be materially increased when the new plant is installed.

IDAHO.

IDAHO COUNTY.

Belle of Thunder Mountain Mining & Milling Co.—This company has expended about $350,000 in the purchase and development of its 37 claims near Roosevelt. It is a Pittsburg corporation, of which C. D. Greenleaf is president. The company has a 40-stamp mill at the end of the wagon road, and at Nampa it has a 12-drill compressor and a 100-h. p. boiler. The mill will be erected on Marble creek and the ore sent down by an aerial tram over a mile long. A plant for generating electricity will be erected eight miles down Marble creek, below the mouth of Cottonwood creek. About 27 men are employed at $2.50 per eight-hour day.

KOOTENAI COUNTY.

Idaho-Continental Mining Co.—This company is shipping about 50 tons of ore daily from the Continental mine, near Porthill, and working 120 men and 129 horses. The ore is said to net $20 per ton in lead and silver. It goes to the Tacoma smelter, the treatment and freight rate being $16 per ton. William Roberts is superintendent. The corporation is planning to float some debentures among the stockholders amounting to $180,000, to avoid selling the 300,000 shares of stock out of $1,500,000, remaining in the treasury.

NEZ PERCES COUNTY.

Big Idaho Co.—This company, in the Big creek district, near Lewiston, is preparing to install a sawmill and a stamp mill. The work at the placers will include the construction of 2,000 ft. of fluming and 1.5 miles of ditch. Work is in progress on a ditch from Big creek, to develop power for the operation of the quartz mill. The company's holdings embrace 8.5 miles of placer and 13 quartz claims. Geo. S. Bailey, of Lewiston, is interested.

SHOSHONE COUNTY.

(From Our Special Correspondent.)

California.—Joseph Keane, manager of this mine, says that the production of ore in 1903 was about $40,000. The main California lode is tied up in litigation.

Douglas.—A strike of high grade carbonates is reported from this mine on Pine creek near Wardner. The drift for 75 ft. has disclosed from 4 to 7 ft. of ore said to assay 35% in lead and 40 oz. in silver.

Standard.—This mine at Wallace, in the Coeur d'Alenes, is experimenting with new processes to handle slimes. Mr. Wilfley, inventor of the Wilfley table, has been testing his new slime table, and Clayton Miller, assistant manager of the Federal Mining Co., is trying the ordinary Wilfley table and the Frue Vanner. The slimes have been handled in the canvas plant which takes up the room required for 14 or 15 tables.

WASHINGTON COUNTY.

A 500-ton smelter is to be built at Weiser, it is reported, by P. H. Hamblin, C. W. Dumont and Harry L. Bingham, all of Chicago. Mr. Hamblin will make Portland, Ore., his headquarters.

MICHIGAN.

(From Our Special Correspondent.)

It is very evident that the coming season will be dull in the iron mining region.

The Verona mine, Menominee range, in which the Lackawanna Steel Co. holds a large interest, is to close down indefinitely. The Caspian, connected with the same company through Pickands, Mather & Co., is also closed. It was a promising exploration developed to a point where a large production might have shortly been achieved. Dober mine, under lease to the Oliver Iron Mining Co., has been closed for two years under agreement with the fee holders. The mine produces a grade of ore that is just now not in demand. Bristol mine, belonging to Oglebay, Norton & Co., of Cleveland, has reduced its force by 100 men and will work single shift only for a time.

Montreal mine, Gogebic range, which has been working easily for some time, has closed, throwing out 125 men. The Newport mine is also closed.

COPPER—HOUGHTON COUNTY.

Calumet & Hecla.—This company struck the Kearsarge lode in No. 19 shaft nearest the Centennial at 95 ft. The shaft, which was started late last autumn, was on December 1 bottomed on the ledge.

Quincy.—This mine is idle on account of a strike of the trammers to resist a cut of $5 per month in wages.

IRON—MARQUETTE RANGE.

Negaunee.—A half-interest in the lease of this mine is reported sold by the Cleveland Cliffs Co. to the Lackawanna Steel Co. for $750,000.

MINNESOTA.

(From Our Special Correspondent.)

It is quite apparent that lake navigation will be open late next spring. There is liable to be an unusual amount of ice, and there is a conflict of authority between vessel owners and their employees to see who shall manage the vessels. The outlook is for not to exceed 22,000,000 tons of ore, possibly not more than 20,000,000 tons, in 1904.

Miners of foreign birth are still leaving for Europe, to pass the winter, or to remain longer if conditions are not good by spring. Probably 1,000 men have left the Mesabi range alone during the past six weeks for points in Finland and Austria, while some Scandinavians have also gone over. The same condition exists on all other ranges, and it is probable that miners who have left the iron regions of Lake Superior during the present winter may number 3,000.

IRON—MESABI RANGE.

(From Our Special Correspondent.)

Pickands, Mather & Co. have closed the Minorca mine, near Virginia, and have pulled the pumps. About 100 men were employed.

It is reported that a find of good hard ore has been made on section 6, T. 58, R. 15, east of Biwabik, and near where recent small ore bodies were cut in explorations on the Spellman lands.

Buffalo & Susquehanna.—This mine, on section 6, T, 57, R, 20, at Hibbing, has started hoisting ore from development work at No. 2 shaft. No. 1 shaft is down nearly 200 ft. No. 2 is 130 ft. deep, and will be dropped to about the level of the other. Drifting will then connect the two. Work began 11 months ago. There is at No. 1 shaft a 6-ton hoisting plant, for double compartments, working in balance. A little ore has been hoisted and is in stock, and the production of 1904 will be large. This mine is subsidiary to the Buffalo & Susquehanna furnaces at Buffalo, and is a 25-year lease, with 100,000 tons annual minimum from Alworth of Duluth, and Hull & Boeing of Michigan. It contains a large tonnage of good ore.

Cleveland Cliffs Iron Co.—This company has begun hoisting ore from its first Mesabi property, Crosby, in section 31, T. 57, R, 22. The mine has not shown up as was expected, and the original plans for stripping have not been

carried out. A shaft has been sunk and the property will be worked to save the grades of ore.

Iroquois Mining Co.—James H. James, of Chicago, has sued M. W. McDonald, alleging fraud in the deal by which this company secured possession of its Mesabi range mine, in section 10, T, 58, R, 18. The company is subsidiary to the Iroquois Furnace Co., a Chicago concern, of Rogers, Brown & Co. The mine is being developed.

Seelman-Daniels.—M. L. Fay and associates have bought an interest in this mine in section 6, T, 58, R, 15, east of Biwabik, where about 800,000 tons of high-grade ore, much of it very hard, have been proved.

IRON—VERMILLION RANGE.

(*From Our Special Correspondent.*)

Minnesota Iron Co.—Rumors to the effect that the Soudan hard ore mines are to resume soon, are without foundation. There is no present intention of reopening the mine.

MONTANA.

CARBON COUNTY.

A good coal property is reported discovered near Bridger in the Bear creek field. Development work is being done in charge of W. Pryde. Others interested are J. E. Mushbach, Henry Rosetta, Dan Davis, Barney Hart and George Pryde.

FLATHEAD COUNTY.

Rustler Mining & Milling Co.—This company, of Libby, K. D. Wrighter, president, will shortly add more tables and a slimer to its mill.

FERGUS COUNTY.

Denver.—A rich vein is reported on this claim at the head of Plum creek, near Kendall, owned by Matt Dunn, of Great Falls. A tunnel is being driven and a small mill will be set up shortly.

Judith Mining Co.—This company, operating the Surprise group, near Gilt Edge, is pushing development. A new tunnel is in about 200 ft., and a large amount of cyanide ore of low grade is reported exposed. W. E. Wilson is superintendent, and a mill is contemplated.

MADISON COUNTY.

Champion.—This mine, adjoining the Watseka, has been idle some time. The son of the late ex-Senator Calvin S. Brice, of Ohio, owns it, and is preparing to operate it.

Clipper-Boss Tweed.—This group, near Pony, has been leased to W. W. Morris, who has about 12 men at work. A process is said to have been discovered to save the values in the ores, the failure of which caused the abandonment of the big mill. Several sub-leasers are on the property.

Toledo.—This mine is owned by the Bismarck-Nugget Gulch Co. The company has installed a new hoist, built shaft houses, boarding houses, enlarged the old Cartier mill at Brandon, has built an electric power plant on Mill creek, and is installing an electric lighting system in Sheridan and building a trolley line between that town and Brandon. L. D. McCall, of Chicago, is the leading man in this county.

Union.—This group, near Pony, owned by Shreiner & Leonard, said to be producing good shipping ore and working 10 men.

Viola.—This group, near Pony, owned by Adkins & Hunt, but leased to the Minneapolis Leasing & Mining Co., is employing from 15 to 25 men. A gasoline engine and hoist were installed recently.

SILVER BOW COUNTY.

Butte Copper Mining & Smelting Co.—More men have been put on at the Dutton shaft at Butte and the output increased. The shaft is down 250 ft., and a new hoist is to be installed and several buildings erected.

Homestake Gold Mining Co.—This company, of Butte, P. Kendrick, manager, will build a mill in the spring for its Sailor's Dream mine.

NEVADA.

NYE COUNTY.

(*From Our Special Correspondent.*)

Montana Tonopah Mining Co.—This company will shortly install an 80 h. p. steam hoist in place of its small gasoline hoist. The shaft now down 677 ft. will be sunk to 767 ft. and a crosscut run to the east ledge. A drift will be run thence to connect with the 950 ft. level of the North Star mine which has reached the Montana Tonopah boundary. Developments on the 600 ft. level show that the ore maintains its high values, the ore being a heavy black sulphide of high value. The company declines to publish its smelter returns.

Tonopah Belcher Mining Co.—This company working the General Thomas mine at Lone mountain, has shipped six car-loads of lead-carbonate ore, netting $4,300. On the 150-ft. level it is opening ore in which galena occurs with the carbonate. The company has 300 tons of shipping ore awaiting the completion of the Tonopah Railroad.

Tonopah-Belmont Development Co.—On the 814-ft. level at 500 ft. east of the shaft a short crosscut has encountered a vein 3½ ft. wide, of high grade shipping ore. This is the most eastern point in the camp at which high grade ore has been found on the course of the Mizpah vein.

Tonopah Monarch Mining Co.—This company has made the final payment of $4,500 on 11 claims at Lone mountain, which it has been prospecting. It is now developing a body of lead carbonate ore 4 ft. wide, 2 ft. of which is of shipping grade.

NORTH CAROLINA.

CABARRUS COUNTY.

Miami Mining Co.—This company, owning the Phœnix mine at Concord, intends to erect a reverberatory smelting plant at Concord, on the main line of the Southern Railway, for the treatment of concentrates and ores. It is the purpose of the company to be in a position to do custom work, when offered, and with this in view the general manager, Dr. F. L. Slocum, will be glad to hear from probable customers.

PENNSYLVANIA.

BITUMINOUS COAL.

Harwick.—This mine of the Allegheny Coal Co., situated in the Freeport district, near Cheswick, a village some 13 miles from Pittsburg, was wrecked by an explosion on January 25. Estimates of the men underground vary from 150 to 190. All but one of these was probably killed by the explosion or suffocated by afterdamp. In attempting to rescue the entombed men, Selwyn M. Taylor, consulting engineer of Pittsburg, who laid out the mine and workings, lost his life. The work of getting out the bodies has proceeded slowly on account of the many falls of rock. The Harwick mine had a vertical shaft 224 ft. deep. The surface plant included a fine steel tipple and ventilating fans, etc., and was regarded as well-equipped and carefully managed. The explosion badly damaged both the hoisting shaft and the air shaft, and the air courses , making rescue of the entombed men impossible. The cause of the explosion is as yet unknown. The mine was not especially gaseous. It had a capacity of 500 tons of coal daily and employed 500 men.

SOUTH DAKOTA.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Clover Leaf Gold Mining Co.—The gold production of the mine is increasing with each successive clean-up. Forty stamps are dropping, clean-ups are made every two weeks, and, approximately, $1,000 a day in gold bullion is saved to the company. The ore on the 700-ft. level, the last opening in the mine, is showing up better than on the sixth, and the north and south stopes on the sixth level are improving.

Homestake Mining Co.—Excavations are nearly complete for the addition to the Homestake cyanide plant No. 1 in Lead. This plant will be practically doubled in size and capacity, and will be able to treat nearly 3,000 tons a day.

Lundberg, Dorr & Wilson.—The new cyanide mill is in commission. It is now supplied with ore from the Buxton and Big Bonanza, but will receive custom ore later.

Pluma Gold Mining Co.—T. A. Harding, treasurer and manager, says that work will immediately start on the cyanide annex to the 40-stamp mill. There is an aerial tramway between the mine and mill.

Spearfish Gold Mining & Reduction Co.—This company holds an option on the property of the Deadwood-Standard Gold Mining Co.

TEXAS.

HARDIN COUNTY.

(*From Our Special Correspondent.*)

Batson's Prairie Oil Field.—The bringing in of the second gusher of the Parafine Oil Co. has created great excitement, and land prices are soaring. The last well is a strong gusher, 1,100 ft. deep and 5 in. in diameter. The Guffy Petroleum Co. has purchased an additional 150 acres of land, and the Hogg-Swayne Syndicate 250 acres. The daily production is between 4,000 and 5,000 bbl., and will be shipped by the Texas Co. pipe line, which is practically completed. The oil is said to have a specific gravity of 29½°, or 5° lighter than Sour Lake crude, while the gas is very plentiful and dangerous. Two men have already been killed and a dangerous fire has occurred. Night drilling is liable to cause disaster and should be strictly prohibited. A summary of the present wells is as follows: Parafine Oil Co., 2 gushers, 1 pumper, 1 drilling, estimated production daily, 4,000 bbl.; Guffy Petroleum Co., 1 gusher, 1 flowing, 2 drilling, production 500 bbl.; Sharp Bros., 2 drilling; W. E. Brice, 3 drilling; Texas Co., 1 drilling; Flemminger Co., 1 drilling; Spindletop Power Co., 1 drilling.

Saratoga Oil Field.—The Texas Co. has completed two 37,500-bbl. steel tanks and its pumping station, so that oil from Saratoga and Batson can be sent to Port Arthur. The daily production of the field is estimated at 2,000 bbl.

JEFFERSON COUNTY.

(*From Our Special Correspondent.*)

Beaumont Oil Field.—J. W. McDaniel has brought in a good producing well near the old Lucas gusher, and will drill several others. There are several wells going down, and about 75 wells are pumping a production that has varied little for several months. The refiners (who are also big producers and big shippers) are loaded up with Sour Lake crude, which, with the recent gushers at Batsons, has forced the price at Beaumont down to 35c. at the well. Producers are talking of independent storage and pipe lines to enable them to hold their oil. At present they must either plug their wells or accept any price offered. With the present northern prices for crude it certainly seems that prices here are absurdly low, especially as the small operators have to accept about 5c. under the price quoted.

UTAH.

BEAVER COUNTY.

(*From Our Special Correspondent.*)

Beaver Consolidated.—On account of the increase of water it was necessary to install pumps. Cross-cutting is in progress on the 500-ft. level and in the sulphide zone.

Revenue.—High grade silver-gold ore has been encountered in this property.

Talisman.—This property, together with other Beaver county mining properties, has been bonded to Clarence Curtis, of Chicago, for a reported consideration of about $150,000.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Shipments.—During the week ending January 22, 143 cars of ore were shipped out of the Tintic district, as follows: Centennial Eureka, 59; Grand Central, 18; Lower Mammoth, 19; Uncle Sam, 3; Yankee, 9; Petro, 3;

Carisa, 6; Victor, 2; Bullion-Beck, 2; Gemini, 7; Dragon iron mine, 11; South Swansea, 3; W. B. Ellis, 1.

Uncle Sam Consolidated.—The new mill is turning out about 60 tons of concentrates daily.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

Bingham Consolidated Smelter.—Shipments of copper bullion for the week ending January 22 aggregated about 240,000 lb., four car loads.

Black Bess.—The directors have authorized the purchase of five additional claims and will begin a 2,000-ft. tunnel in the spring. J. A. Mahon, of Salt Lake, is manager.

Ohio Copper.—The Winnemuck mill, recently leased by this company, went into commission on January 22.

United States Smelter.—Lead furnaces will be added at once. Shipments of copper bullion for the week ending January 22 aggregated about 181,000 lbs.

Utah Consolidated Smelter.—Shipments of copper bullion during the week ending January 22 aggregated five car loads, 301,000 lb.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

Daly-Judge.—At a meeting of the directors the issue of $300,000 worth of gold bonds was authorized for future development. The mill is to be closed at once, and remain so until a closer saving method is found. Manager N. Dunyon claims that 150,000 tons of good milling ore are blocked out.

Ontario.—The new mill is practically ready. The initial capacity is 40 tons daily.

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Honerine.—The drain tunnel is being advanced over 7 ft. per day. The new mill, it is said, will go into commission in about 30 days.

WASHINGTON.

FERRY COUNTY.

Pearl Consolidated Mining Co.—An order has been received to be ready to resume work on the Lone Pine claim at Republic February 1. A vertical two-compartment shaft is to be sunk 380 ft. About 2,800,000 Lone Pine-Surprise shares have been turned over for a like number of Pearl Consolidated shares, with 2c. per share, the first assessment. The second assessment of 2 mills per share has been declared, payable February 11.

Quilp.—Prospecting work is conducted on the 400 and 500 ft. levels of this Republic mine, and ore is being stoped above and below the adit. About 30 men are employed.

Tom Thumb.—This Republic company has been reorganized and placed on an assessable basis. Work will be resumed under new management.

FOREIGN MINING NEWS.

AFRICA.

TRANSVAAL.

The corrected statement of gold production for December shows a total from all the Transvaal mines of 286,061 oz. fine. This makes a total for the year 1903 of 2,963,741 oz., or $61,260,526. This compares with 1,704,410 oz. in 1902, showing an increase of 1,259,331 oz., or 76.8% over last year.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—For the week ending January 16 shipments aggregated 16,290 tons, as follows: Granby, 10,630; Mother Lode, 3,840; Emma, 750; Senator, 120; Oro Denoro, 570; Athelstan, 380. Total for the year to date, 32,430 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—For the week ending January 16 shipments amounted to 10,955 tons, as follows: Le Roi, 6,900; Centre Star, 1,380; War Eagle, 1,260; Kootenay, 215; Jumbo, 350; Le Roi No. 2, 600; Le Roi No. 2 (milled), 220; Spitzee, 30. Total for the year, 22,198 tons.

MEXICO.

COAHUILA.

(*From Our Special Correspondent.*)

Compañia Minera del Saltillo.—This company, of Saltillo, is building a tramway from its Jesus Nazareno mine to Bonanza, in the State of Zacatecas. The mine is a high grade silver-lead property, and is near the mines of the Mazapil Copper Co., Ltd., of Concepcion del Oro. The tramway is five km. long and will have a capacity of 100 tons a day. It is built by the A. Leschen & Sons Rope Co., of St. Louis, Mo., and is of the Dusedau patent friction grip type.

The carrying cables, of the flattened strand type, are 1 in. thick for the loaded side and .875 in. for the empty side. The traction rope is .75 in. thick. The line will have an intermediate loading station, and eventually a third intermediate loading station will be put in. Up to now all the ore had to be carried down by burros, and the cost of transportation was very high. The company has on its patios about 3,500 tons of ore piled up.

OAXACA.

(*From Our Special Correspondent.*)

Santa Fe Mining Co.—This company, of Oaxaca, will develop the Santa Fe and Rambo properties, in the El Centro district, about 10 miles northwest from Oaxaca, consisting of 40 *pertenencias*. Development on the Santa Fe claim consists of an inclined shaft, down about 100 ft.. and a vertical shaft, being sunk on a 20-in. vein of ore that was recently opened up by a 25 meter crosscut run from the drainage tunnel, at a depth of 100 ft. The total work done may amount to 1,400 ft., more or less.

The ore is reported to assay $36 gold to the ton.

MINING STOCKS.

(Full quotations given on pages 184 and 185.)

New York, Jan. 27.

For several days the stock market showed a strong undertone, but the public refused to come in, and the situation weakened perceptibly. Subsequently many shares held by professionals were thrown on the market, causing a recession in prices. Amalgamated Copper showed fairly large transactions, and, having declared the usual quarterly dividend of 0.5%, fluctuated on narrow limits, between $49.75 and $51.875. Anaconda was quiet at $18.50@$19.03. Greene Consolidated, of Mexico, attracted attention, as a meeting has been called for February 10 to increase the capital stock by 144,000 shares to $8,640,000. Stockholders are privileged to subscribe for this new issue at par, $10, the proceeds to be used in paying off the current liabilities. At first a bond issue of $2,800,000 was suggested, but President Greene considered $1,800,000 more than enough, hence $1,440,000 has been finally decided on. It is also intimated that Mr. James Douglas, president of the Copper Queen Consolidated Mining Co., will be added to the Greene directorate. Greene shares sold this week at $11.50@$12.25. Tennessee is lower at $28. White Knob, of Idaho, sold at $8.50@$7.75, and British Columbia at $3@$3.75.

Three Utah stocks changed hands—Ontario at $4.50, Daly at $2, and Horn Silver at $1.15.

Colorado shares are quiet. Portland, of Cripple Creek, moved at $1.55, while Elkton advanced to 63c., the highest in some time.

The Comstocks show a reaction. Ophir dropped from $4.85 to $3.65; Consolidated California and Virginia was stationary at $1.65, and Confidence at $1, while Mexican lost 1c. to 89c. Silver Hill brought 80@79c.

Among the largest holdings of the late William E. Dodge, valued by the New York State Appraisers, were: Copper Queen Consolidated Mining Co., 52,447 shares, $1,048,940; Montezuma Copper Co., 9,620 shares, $481,000; Detroit Copper Mining Co., 10,000 shares, $300,000; United Globe Mines, 6,250 shares, $187,500; North Star Mines Co., 20,000 shares, $100,000.

Boston. Jan. 26.

(*From Our Special Correspondent.*)

Although there has been a fair amount of activity in this market, net changes in the prices of stocks are unimportant as a rule. Few show net advances during the week and many are lower. The reactionary tendency is due to the delay in handing down the Montana Supreme Court decision in the MacGinniss—Amalgamated suit and also to the failure of domestic consumers to enter the metal market. The foreign demand, it would seem, has been pretty well filled.

United States Mining was the most active stock in the local list the last calendar week, with sales of 22,775 shares. The stock in the meantime advanced $1.12½, to $22, with reaction to $20.75 to-night. Appearances would indicate pool operations. It is said that the management expected to commence dividend payments by July on a small basis.

Centennial dropped $2.50 to $15. A $4 assessment has been levied, one-half being payable February 12 and the other half July 12. The last call was $5 per share on the outstanding 90,000 shares in November, 1900. The treasury still retains 10,000 shares. The management feels that the value of the mine has been established through the Kearsarge lode. No. 1 shaft is down below the twenty-seventh level. It is thought that control of Centennial rests in hands friendly to the so-called Standard Oil interests. Utah Consolidated went off $1 to $33.50, recovering one-half. Trading in this stock has shaded off materially. The new concentrator is expected to be in operation by the middle of March 6. Old Dominion is $1 lower for the week at $10.50 on limited dealings. The latest in Old Dominion affairs is the bill in New Jersey for the appointment of a receiver, which is returnable February 8. The Old Dominion Co. of Maine is the defendant. This and the United Globe properties are now understood to be operating as one property.

Copper Range is still slow, the price variation during the week being between $46.25 and $44.87½. Whatever manipulation there is, is for lower prices in this stock. Tamarack is off $10, to $110, on no special trading. Osceola is also lower, being off almost $2 to $59.87½. It is said that about 40,000 shares of the latter are held in Michigan. Isle Royale has shown some life and has risen $1.50 to $9.25 on what was said to be buying for New York account. Calumet & Hecla is up $15 to $455 on news that in the Kearsarge lode lead had been struck in No. 19 shaft at a depth of 95 ft. This gives Calumet three big working lodes. Quincy is steady around $96@97.50. The $2.50 dividend declared makes $5.50 for 1903, the same as for 1902.

United States Coal & Oil spurted to $10.12½, but reacted to $9.50. The oil lands have finally been taken over by Standard Oil interests and the company has about $750,000 working capital. Over one-half of the stock is held by insiders. Mohawk has lost $1.50 to $37.50. Parrot $1.50 to $22.25. Dominion Coal is off $5.50 to $62.

The annual report of the Victoria Mining Co. shows $47.202 cash on hand January 23, 1904, with $95.000 out on loans, a total of $142.202, against $213,392 a year ago. There is 57,750 assessment money due.

Colorado Springs. Jan. 22.

(*From Our Special Correspondent.*)

As predicted in this letter for the past few weeks, the mining market in Cripple Creek shares has experienced a sharp reaction, and the prices now prevailing on the local exchange are higher than for many months. The recently reported finds of mineral of exceptional value explain the activity on the Colorado Springs exchange during the past week, as they have given the investing public renewed confidence in the camp and stamped it as being of more than ordinary importance.

Almost without an exception, the listed stocks are quoted higher than a week ago, the advances ranging all the way up to 100%.

Duluth. Jan. 23.

(*From Our Special Correspondent.*)

Duluth and the Lake Superior copper country have become rather important centers for some special mining stocks in the past year or two. Chief of these are the Bisbee, Arizona, coppers. These stocks are unlisted and are

controlled in the lake country, with large holdings in Pittsburg. Boston had no voice nor share in floating nor financing the companies, which were all taken by mining men on heavy cash payments. The method followed by most of these companies has been to organize development companies, composed entirely of those associated with the management, and to put up sufficient money to prove value. If the expenditure of this money has shown mines, reorganization into mining companies takes place, and development stockholders are given prior rights for subscription of the entire stock, at par. In the case of Calumet & Arizona and Calumet & Pittsburg, $1,000,000 each was raised in this way upon organization of the mining company. In the Calumet & Arizona, by the expenditure of $500,000 on property account and $900,000 on development, the mine was brought to productive stage. Its first dividend was paid December 19, 1903, and a second will be March 19. The first was $1.50, regular, and 50c., extra, taking $400,000, and the second will be similar, or simply the $1.50, regular. The company's policy is to accumulate a large surplus, and this now amounts to about $1,200,000. In the case of Calumet & Pittsburg, $1,000,000 is now on hand and subject to call, and the company should be producing copper in a year. Each company is stocked for $2,000,000 in $10 shares.

The market has been strong and active, on account of favorable news from developments and the metal market. Calumet & Arizona has advanced from $91 to $100 a share, with sales at the latter; Calumet & Pittsburg has advanced from $20 to $22.50; Lake Superior & Pittsburg, capitalized at $400,000, from $112 to $122; Pittsburg & Duluth, capitalized at $750,000, from $45 to $50.

Other Lake Superior properties in the Bisbee region have not fared so well, either in showings of mineral or in price. Calumet & Cochise, $10 paid in, is quoted at $5.50. Calumet & Bisbee, $10 paid in, is at $6.50. Junction Development, $4 paid in, is at $11. Houghton Development has just made a second call for funds, and is both sinking and tunneling. It will have $5 paid in on the 40,000 shares of each $25, and may call no more. Calumet & Cochise and Calumet & Bisbee have shafts down 925 and 955 ft., respectively, are bothered by water, and are drifting. They will install pumps. Calumet & Pittsburg has Prescott pumps of 4,500-gal. capacity under construction, and will place them in March. Copper Glance has put in a diamond drill and is boring in conglomerate rock from the 540-ft. level.

San Francisco. Jan. 20.

(*From Our Special Correspondent.*)

The market has been more or less excited during the week, especially for Ophir. This stock at one time went up as high as $5.25, but reaction carried it down below $4, and the closing quotation to-day is $3.90@$3.95. The other Comstocks were more or less affected by the course of the leader, and showed considerable variations. At the close, however, the tone of the market was rather weak.

Some sales noted were as follows: Consolidated California & Virginia, $1.70; Mexican, $1.75; Sierra Nevada, 70c.; Yellow Jacket, 40c.; Gould & Curry, 85@90c.; Challar, 23@24c.; Potosi, 20@22c. per share.

On the San Francisco & Tonopah Exchange business has been pretty active this week. Stocks sold freely, and generally at higher prices. At the close quotations were strong. Tonopah of Nevada brought $5.50; Montana Tonopah, $1.25@$1.30; Tonopah Belmont, 65@70c.; Tonopah Midway, 40@45c. per share.

On the California Exchange business in oil stocks was not specially active, and the amount of trading was moderate. Little change in prices was recorded, however. Kern Oil sold for $4.50; Home, $1.10; Sovereign, 38c.; Lion, 1c. per share.

COAL TRADE REVIEW.

New York, Jan. 27.

ANTHRACITE.

The anthracite trade shows no material change in conditions from last week. The weather, particularly at inland points, has been of the coal burning variety, though a thaw late last week temporarily affected the market. No change in prices is at all probable before April 1, and then the reduction will probably be about 50c. a ton. The shipment of coal to the west has been hampered more or less by snowstorms and floods along the lines of certain railroads, while in the coastwise trade barges have been having a hard time with ice, and a considerable number have been sunk.

In the Northwest the demand from small yards is about as it has been, there being a general disposition to buy as little as possible during the winter and yet have no stocks on hand when navigation opens. At Chicago retail trade has been greatly stimulated by the recent cold wave, but wholesale trade is very little more active than it has been. The cold weather has brought some orders from points west of Chicago, where buying so far this winter has been light, owing largely to the liberal offerings of smokeless coals and of semi-anthracite from Arkansas. Arrivals at Chicago by rail have been light, but supplies are sufficient for all needs. Along the lower lakes receipts of coal have been greatly hindered by heavy snowstorms, and there has been a slight shortage of coal at some points. Along the Atlantic seaboard the moderate weather late last week allowed a freer movement of coal to certain ports, where docks have been frozen up. Lower temperatures have since then made conditions nearly as bad as they were before. There is no prospect for the market being on any other than a weather basis for the balance of the winter. The steam sizes are in demand; most producers report business good. As these sizes are largely sold on contract, the present demoralization of the soft coal market does not affect them much.

BITUMINOUS.

The Atlantic seaboard bituminous trade continues quiet, and even the better grades of coal are affected by the dull market. Some of the specialties have recently been offered at small concessions. In Clearfield coals the margin between the selling price and the cost of production is now so very slight that producers cannot afford to make similar concessions. A question that has come up about this time for several years past is again to the fore. It is, who shall handle New River coal? The present outlook is that the question will be answered this year as it was last.

Generally speaking the market in all consuming territories shows slack demand. Consumers are not using as much coal as they were, and they have, at nearly all points, fair stocks on hand. The only difficulty confronting the trade just now is that of water transportation. Many boats have been sunk by ice, and the ice fields in Long Island Sound last week were the worst in 20 years.

In the far East trade is quiet. The shipments of coal from the Virginia capes are displacing shipments from Philadelphia, and it is reported that the New York, New Haven & Hartford railroad is continuing the policy it began last year of diverting coal from Philadelphia by making rates on hauls from receiving ports in favor of all-rail shipments. Along Long Island Sound demand is not as brisk as it was, consumers having fair supplies. At New York harbor demand is slack. Fair grades of Clearfield are selling for $2.50@$2.60, f. o. b. New York harbor shipping port. In the all-rail trade business is lighter, due apparently to a temporary cutting down of orders.

Transportation from the mines to tidewater is fairly prompt, coal running through in a week. Car supply is generally sufficient for the demands of producers, though any unusual call finds a slight shortage. In the coastwise vessel market conditions are about as last week. Philadelphia and Baltimore are still closed by ice. Rates from Norfolk and Newport News are to Boston and Portland, 70@75c. From New York harbor rates are to Boston and Portland, 80@85c.; to Providence, New Bedford and Long Island Sound 65@70c.

Birmingham. Jan. 25.

(*From Our Special Correspondent.*)

The coal trade in Alabama continues active. The larger producers in this State have been moving coal rapidly. Some of the coal operators have recently been to Louisiana looking after contracts for future delivery. Shipments have been steady right along. The Tennessee Coal, Iron & Railroad Co. is moving men from the Johns mines to the Sumter mines, but this will not disturb the total output.

The Southern Railway is pushing the extension on Cane creek, and inside of four months will have completed the line. Three mines are now being opened by the Bessemer Land & Improvement Co.

Prices for coal are fair. The coal miners are expecting an advance in wages during the coming month. It is believed that iron prices will warrant the advance of at least 2.5c. on the ton.

Chicago. Jan. 25.

(*From Our Special Correspondent.*)

The wholesale coal market for both anthracite and bituminous has been a dull one for the last week; the signs at the beginning of the present week, however, are favorable for a large business. Warm weather and large stocks laid in last summer are responsible for the situation as regards anthracite. The warm weather, however, ended with a sudden drop Saturday, all over the upper Mississippi valley, and the results of the change are shown in largely increased orders to-day. The car price of anthracite continues $6.50, with no prospect of a change before spring. Retailers get $7.75 in the city.

Although the cold wave has stiffened the bituminous market a little, it has to be confessed by candid dealers that there is still more coal produced than there is a lively market for. As usual, the trade is best in the cheaper grades of Illinois and Indiana. Run-of-mine from the mines of these two States brings $1.60@$2.10; lump, $2.10@$2.75, and screenings, $1.20@$1.75. Hocking is quoted at $3.50@$4, according to quality, and is selling largely. Smokeless sales are still much below the hopes of agents, though increasing; there is plenty of smokeless to be had at $3.40@$3.65. The demand for gas coals continues light.

Cleveland. Jan. 26.

(*From Our Special Correspondent.*)

The coal trade of this territory was given a boom by the floods which prevailed the latter part of last week. The railroads suffered from the floods terribly, and traffic was interrupted in all parts of the State. This hampered the delivery of coal to the various centers of trade, with the result that the supply was seriously shortened. The cold weather had used up about all of the coal stocks in the city. This left the market dependent entirely upon the immediate supply. The Cleveland market did not get the supply it needed, and in some places there was suffering. The domestic coal supply was heightened by the inopportune failure of the gas supply, and by the consequent increase in the consumption of coal.

Steam coal prices took a jump of 50c. to 75c. on Monday in the Cleveland territory. Many of the concerns which had been running hand-to-mouth in the matter of coal supply found themselves short on Monday and began making inquiries. Some of the producers hawked about their supply, getting good, liberal prices for it, while a few took care of the trade regardless of any immediate profit. Prices have appreciated slightly. Ohio steam coal at the mines runs about $1.10@$1.20, while Pittsburg coal runs $1.25@$1.35 at the mines. Coke is rather easier, with a good fair demand for it. The delivery was hindered by the floods and the material became scarce. The price holds at $2.25@$2.50 for good 72-hour foundry coke at the oven and $2@$2.10 at the oven for high sulphur cokes.

Pittsburg. Jan. 26.

(*From Our Special Correspondent.*)

Coal.—The river coal mines were all idle during the week, owing to the high water and the flood, the stage of water at Pittsburg being 30 ft. Despite the heavy ice that passed down the Monongahela, but little coal loaded in boats and barges was lost. The waters are receding and to-day it is believed that before the end of the week a large tonnage of coal may be shipped to the southern ports. There is fully 25,000,000 bush. loaded, and it is expected that

most of it will get out. The railroad mines operated more fully last week, and prices are firm, run-of-mine being quoted at $1.25@$1.40 at mine. Slack is firm at 85c. Reports from the convention at Indianapolis of the United Mine Workers are to the effect that a demand is to be made for a stiff advance for machine mining; the pick mining rate will remain at 90c. for coal mined over a 1¼-in. screen. Some districts urged a demand for $1 a ton.

Connellsville Coke.—The coke trade is active, and both production and shipments are increasing. Standard Connellsville furnace coke is held at $1.65@$1.75. Good furnace coke can be had as low as $1.45. The best grade of foundry coke is quoted at $2.10@$2.25. According to the last report of the *Courier* the production was nearly 50,000 tons greater than the previous week, the total being 164,888 tons compared with 115,503 tons. The shipments for the week amounted to 7,233 cars, an increase of 1,039 cars. The shipments were distributed as follows: To Pittsburg and river points, 2,753 cars; to points west of Pittsburg, 3,190 cars; to points east of Everson, 1,290 cars.

San Francisco. Jan. 20.

(*From Our Special Correspondent.*)

Mr. J. W. Harrison's circular of this date says: "Since December 31 there have been six arrivals of vessels from Australian ports with coal cargoes; total, 20,409 tons. There are now but 14 vessels on the engaged list to carry coal from Australia to this port, their capacity being about 41,000 tons; of these there are but 5 already afloat, and the major portion of the remainder will not arrive here before five or six months hence. January 15 colonial coal has become dutiable at 67c. per ton, duty being added to the selling price here. This will prove a detriment to its sale in this market; as the British Columbia product has to contribute the same amount of duty as colonial coal, they will each be placed on the same footing when seeking trade. The deliveries of Australian coal here for last year are 78,858 tons in excess of 1902; this was principally brought about by the abrogation of the duty during the year, and partially by the labor disturbances in some of the British Columbia collieries. Hence the outlook for free deliveries this year from the colonies should be somewhat diminished. The coal consumption of California for 1903 was 230,000 tons less than the year previous; this was brought about by the excessive output of fuel oil, which was over 20,000,000 barrels."

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is still nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland, with very light stocks. Foreign coal in cargo lots is quoted at $13 for Welsh anthracites; $8.50 for cannel, $7.50 for Wallsend and Brymbo.

FOREIGN COAL TRADE.

Jan. 27.

The export market continues quiet here. Some Alabama coal is reported going to Mexico and South American ports. These shipments are made from Pensacola.

Messrs. Hull Blyth & Co., of London and Cardiff, report, under date January 15, that the Welsh coal market remains firm and steady. Quotations are: Best Welsh steam coal, $3.78; seconds, $3.66; thirds, $3.36; dry coals, $3.60; best Monmouthshire, $3.36; seconds, $3.24; best small steam coal, $2.04; seconds, $1.68; other sorts, $1.44.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthsire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

The freight market remains steady and chartering active. Some rates quoted from Cardiff are: Marseilles, $1.35; Genoa, $1.44; Naples, $1.32; Las Palmas, $1.36; St. Vincent, $1.50; Rio Janeiro, $2.04; Santos, $2.40; Buenos Ayres, $1.68.

IRON TRADE REVIEW.

New York, Jan. 27.

The waiting policy on the part of buyers seems to have had some effect this week. A disposition to shade prices is manifest, and orders for pig iron have been placed at reductions of 25c., and in some cases 50c. per ton. Buyers, however, are not placing orders far ahead, as there is no object in doing so. The conditions are such that there is no difficulty in getting orders filled promptly. At the same time there is a slight increase in production, and several blast furnaces are reported starting up.

The deadlock in steel rails still continues. The railroads are placing no orders, and it is even said that some orders placed last year are being canceled. There has been no meeting of the rail makers, and no sign is shown of a disposition to give way.

In other finished material conditions are very much the same as last week. The sheet market seems to be quite demoralized, and prices are being liberally shaded. There are also reports of offers to shade prices on structural material, but nothing definite can be ascertained. A little more business is reported in bars, but it is said to have been done on concessions made by the mills, in order to secure business.

Reports are current that the principal interest has made an agreement to stop its efforts to secure the trade in tin-plates by making concessions on plate for export, and that in return the Welsh tin-plate makers have agreed to place here heavy orders for sheet bars and billets. The report is not substantiated, and parties chiefly interested decline to make any statement in the matter. It must still be regarded as rather doubtful.

Negotiations for the sale of the Clairton Steel Co. property to the United States Steel Corporation have been renewed. This time there is a prospect that the deal may go through. It is said that the Clairton Co. threatened to cut liberally on billet prices, and that the renewal of the negotiations was the result.

Birmingham. Jan. 25.

(*From Our Special Correspondent.*)

The pig iron market in the Southern territory is quiet, though it is claimed that prices are firm. A rumor has prevailed for the past few days that Southern iron manufacturers have been cutting prices again, but close inquiry fails to ascertain how this rumor started or whether there is any truth in it or not. When asked as to quotations, it is stated that No. 2 foundry iron is being held at $10 per ton. The statement is heard from other sections, though, that Southern furnacemen have been selling at from 25c. to 50c. under. There is considerable iron moving, on orders taken before the first of the year.

The production of iron in Alabama continues undisturbed. The blowing in of the new furnaces of the Alabama Steel & Wire Co. at Gadsden is noted, the first week's operation of the new furnace has proved quite satisfactory.

There is considerable moving about going on among the Southern manufacturers, and there is a belief that some sort of a pool has been organized or is about to be organized. J. C. Maben, president of the Sloss-Sheffield Steel & Iron Co., is now in the East, while other officials and representatives of manufacturing companies of the South are there also.

The following quotations are given: No. 1, foundry, $10@$10.50; No. 2, foundry, $10; No. 3, foundry, $9.50; No. 4, foundry, $9; gray forge, $8.50@$9; No. 1 soft, $10.50; No. 2 soft, $10. As stated above, there are rumors that all these prices are being shaded.

There is but little improvement in conditions with finished iron and steel. The Gate City rolling mills, belonging to the Republic Co., and the Bessemer rolling mills, belonging to the Tennessee Co., are both in operation. The Bessemer plant started up last week with all indications for a steady and lengthy run.

Chicago. Jan. 25.

(*From Our Special Correspondent.*)

Sales of pig iron are still in small lots, compared with sales of six months to a year ago, but the time between orders and sales is being gradually lengthened out—a hopeful sign of a return to former conditions. The consumer is losing his apprehensions about further declines, and is becoming willing to look ahead to his trade needs instead of buying from hand-to-mouth. Southern is still the great source of supply for the local market, and sales are said to have been made as low as $9.50, Birmingham, for No. 2, or $13.25, Chicago, though the nominal quotation is $10. Probably in many cases $9.75, Birmingham, has been obtained. The temper of selling agents is optimistic, though as yet things are not coming their way to an alarming extent. There is not much trouble from transportation, speaking generally.

Northern iron continues to command about 50c. over Southern, or $13.85@$14.35. The demand for northern is not so variable as that for southern, the iron being steadily used for mixtures. It is asserted by Northern manufacturers that there is no money for them at the present prices, notwithstanding the making of every change possible in the curtailment of the cost of production, on the first of the year.

Coke is plentiful, and there seems no danger of a shortage. The price is $4.75@$5 per ton.

Cleveland. Jan. 26.

(*From Our Special Correspondent.*)

Iron Ore.—The movement of iron ore away from the lakes has been very slow and the market is dead. Nothing is yet being done in the way of fixing the prices for that material for the coming year.

Pig Iron.—The buying of pig iron has improved materially. The need seems to be entirely for spot delivery. The market is, therefore, without much interest. Prices have been declining while the demand improved. Furnaces have been offering iron at $12.50 on long-time contracts, while holding for $12.75@$13 in the Valley for No. 2 on spot shipments. Bessemer and basic show some signs of improvement, as an inquiry now and then comes in for a small lot. There is no general quickening of the trade.

New York. Jan. 27.

Pig Iron.—A few fair-sized sales are reported, but the market is quiet and business is light. We quote as follows, for northern irons, good brands: No. 1 X foundry, $15.25@$15.75; No. 2X, $14.75@$15.25; No. 2 plain can be had for 50c. less; while gray forge is selling around $13.75. For southern irons on dock quotations are: No. 1 foundry, $14.25; No. 2 foundry, $13.75, with lower grades in proportion. No. 1 soft can be had at about $14.25, and No. 2 soft at $13.75.

Bar Iron and Steel.—Refined bars are quoted at around 1.45c., in large lots, with steel at about the same. Common iron bars are as low as 1.30c.

Plates.—Buying shows little change. Orders are for small lots, but business is not bad for this season. Sheared plates are quoted as follows: Tank, 1¼-in. and heavier, 1.76@1.80c.; flange, 1.95@2.05c.; marine, 2.10@2.15c.

Structural Material.—The market has not improved much. Large lots at tidewater are quoted at 1.75@2c. for beams, angles and channels.

Steel Rails.—The quotations remain $28 for standard sections, f. o. b. mills; light rails, $33@$36, according to weight.

Philadelphia. Jan. 27.

(*From Our Special Correspondent.*)

Pig Iron.—The market was surprised by further cut in prices of about 25c. per ton. This drop has served to obstruct the closing of certain negotiations which were on the point of going through. Quite a number of purchases have been made since last report; two or three of them quite large lots, including one lot of basic iron. Buyers in this territory are anxious to find where they stand, and they are willing to come into the market as soon as it settles.

Rumors of further breaks in prices are having an unsettling effect. Inquiries are at hand today for additional supplies of basic, and as it is the steadiest on the market and less liable to fluctuate than any other kind, it is probable that before the week closes some important transactions will have been closed. Nothing is being done in forge, and very little in Nos. 1 and 2 foundry. Our foundry people are watching the course of the market with more than usual interest. It is impossible to give exact prices, but a fair range is as follows: 1 X foundry, $15.25@$15.75; No. 2 X, $14.50@$15; No. 2 plain, $14@$14.50; basic, $14; gray forge, $13.

Plates.—The plate market shows retail dealings altogether. This source of demand is satisfactory, and all of the smaller plants throughout our territory are working nearly up to their capacity. A good many orders for engines and boilers, as well as for tank work, have been secured since the opening of the year, but the builders have not decided to place orders until with a few days. Tank steel, according to thickness, ranges from 1.80@2c., and locomotive firebox from 2.20@2.30c.

Old Rails.—Several lots have changed hands on a basis of $16 for iron and $12 for steel. It is said that arrangements have been made with some southern companies to make an exchange for old rails for new which involve the transfer of a good deal of material.

Scrap.—There is a general upward tendency in scrap growing out of heavy dealings. Heavy steel scrap is now wanted, and $12.50 was paid for two or three lots this week.

Pittsburg. Jan. 26.

(*From Our Special Correspondent.*)

There is but little change in the pig iron market, sales being confined to small lots for early shipment with prices a trifle easier than a week ago. Inquiries are still being received, but no extensive contracts for future delivery are being closed, and from present indications there is not likely to be any heavy buying for some time. During the past few years the United States Steel Corporation has led in a buying movement by placing a large order for outside iron for first-quarter delivery. It is not probable that the big interest will enter the market during the first half, unless there is a much greater improvement in the demand for finished products. The corporation is not operating all of its blast furnaces, although all but one at the Edgar Thomson group, in the Pittsburg district, are in blast. Several of its furnaces in the Valleys were started during the week, and others are ready for operation at any time the iron is needed. A rumor was started this week that the old plan to combine the furnace interests of the Valleys and build a steel plant is to be revived. There does not seem to be any ground for the report outside of the fact that something ought to be done to stimulate the demand for the product. Some furnaces of independent steel interests in the Wheeling district are expected to resume within a month, but this will depend entirely on the condition of the steel market.

The demand for finished steel does not show any improvement, but all the mills that were running last week are still in operation, and there is enough business on the books to keep them in operation for some time, even if new orders are not received. The fact that the railroads are keeping out of the market, and in some instances cancelling orders for rails already placed, is having an effect, and is apparently delaying the placing of orders. It is contended that $28 for rails is too high, when nearly every other finished iron and steel product has been reduced. The Edgar Thomson rail mill of the Carnegie Steel Co. is in full operation again, and will be run steadily. On Sunday night the "old rail mill," the original mill built by Capt. William R. Jones for Andrew Carnegie and the late Thomas Carnegie, about 30 years ago, was put in operation. It had been idle since early last fall. The mill has been put on light rails, and this may interfere with the plans for a combination being arranged by the independent light rail makers. Another meeting of the independent interests will be held here early next month. At the last meeting an agreement was entered into to maintain prices, since which time the light rail market has considerably strengthened. The demand for wire products continues, and the advance of $1 a ton is being strictly maintained. Plain wire in car-load lots is now 1.80c. base, and wire nails $1.90 a keg, base Pittsburg, plus freight to destination. The drop in prices of common bar iron has been checked, and this week it is impossible to get any concession from the price of 1.25c. at which a number of large orders recently were placed. Some sales have been made during the week at 1.30c. Youngstown.

There is a fair demand for sheets, but sharp competition since the wage concession by the Amalgamated Association of Iron, Steel & Tin Workers on January 1 has kept prices down. The leading interest has sold No. 28 gauge black sheets as low as 2.25c., which can be done on account of the cheap labor cost at its non-union plants. The Amalgamated Association yesterday ordered strikes at the plants of the Parkersburg Iron & Steel Co. at Parkersburg, W. Va., and the Muskingum Valley Iron & Steel Co. at Zanesville, O., for alleged violation of the modified scale. These concerns are said to have agreed to the new scale at the special convention held in this city on December 8. The reduction of 10% granted at that time and the increase of the limit of output from 135 to 150 pairs per turn, it is contended, is not sufficient to meet non-union competition.

An announcement of the sale of the Clairton Steel Co. to the United States Steel Corporation is confidently expected. Chairman W. G. Park, of the Crucible Steel Co. of America, owner of the Clairton concern, who is also one of the receivers of the company, has been in New York for several days, and it is said his mission is to negotiate the sale. It is said that, unless the deal is closed the Clairton Co. will leave the billet pool, which might result in an open market and seriously disturb conditions. No official information has been given out regarding the sale, but in steel circles here it is believed the result of the negotiations will be entirely satisfactory.

Pig Iron.—Gray forge led as to pig iron sales this week with 1,200 tons at $13, Pittsburg. Several lots of foundry No. 2 have been sold at a concession of 25c., the minimum price being $13.60, Pittsburg. No sales of bessemer, either large or small, seem to have been made lately. Bessemer iron is quoted at $13, Valley furnace, and it is believed $12.75 could be done.

Steel.—The billet market appears to be firm although there is but little business. Pool prices of $23 for bessemer and open-hearth billets are being maintained. The plate market is fairly active, and the price is firm at 1.60c. Steel bars remain at 1.30c.

Sheets.—Considerable new business is being placed, but competition is active and prices are low. A number of independent plants have been started under the modified wage scale of the Amalgamated Association, and are booking some good orders. Black sheets, No. 28 gauge, are quoted at 2.25c. and galvanized at 3.30c.

Ferro-manganese.—There is but little change in the market, 80% domestic still being quoted at $45@$46.

(BY TELEGRAPH.)

Pittsburg, January 27.—The American Sheet & Tin-Plate Co. has made a reduction of 15c. per box, making 100-lb. coke tin-plate $3.45 per box at mill, in the Pittsburg district.

Cartagena, Spain. Jan. 9.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—Since our last report there has been shipped one cargo, 1,800 tons dry ore, to Great Britain.

The year which has just closed has been decidedly a gloomy one as far as the iron ore trade has been concerned. The steady fall of the iron market naturally had a most depressing effect upon the iron ore trade, which effect was still more felt in districts such as this, where in most cases the iron is worked in a large number of small mines burdened with heavy taxes and transports. The total amount of iron ore shipped during the year was 375,730 tons, as against 365,000 tons for 1902, and 338,881 tons during 1901. Of the 375,730 tons above referred to, 149,181 tons were shipped by Messrs. Barrington & Holt. As in previous years, by far the largest quantity of ore went to Maryport, where the chief consumers were Messrs. Cammell & Co. and The Moss Bay Co. for dry ore, while the manganiferous ore went to the Workington Iron Co. Middlesboro, Glasgow, and Mostyn quay, were also British ports to which some of the above ore was shipped. There was a considerable falling off in the proportion of ore shipped to Rottterdam, as compared with the previous year.

Prices remain nominally at 6s. 9d.@7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorus; 8s. 9d. for special ore; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. 6d. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites, 10 per cent iron and 43 per cent sulphur, are quoted at 10c. 6d. per ton, f. o. b. shipping port.

CHEMICALS AND MINERALS.

(See also prices-current on page 186.)

NEW YORK, Jan. 27.

Trade is better, and prices are generally firm. Some inconvenience is still caused by delayed transportation, owing to the stormy weather.

New York exported 6,205,782 lb. bicarb. soda in 1903, of which Great Britain and Australia took 2,467,848 lb., and 3,366,097 lb. caustic soda, of which Japan received 1,438,643 lb.

Some of the larger Portland cement manufacturers have recently booked contracts for a good part of their output in 1904, and a few have taken orders into 1905 at satisfactory prices. Interest is centered in the government contract for 150,000 to 200,000 bbl. of cement for the Tonto basin dam in Arizona. Owing to the magnitude of the work and the high cost of the material, if purchased from an independent manufacturer, the government bought a mill, intending to make the cement at the site of the dam. Subsequently, however, bids were invited for 1,000 bbl. or more of cement, and on January 4 the lowest bid received was $4.80 per bbl. On this basis the Association of Portland Cement Manufacturers has urged the government to invite bids for all the cement, either f. o. b. mills, or for its manufacture in the government mill. It is claimed that it will be cheaper for the government to have the work done by contract than to go into the business of manufacturing.

Cyanide.—Quiet at 19.5@20c. per lb., f. o. b. New York.

Bleaching Powder.—Aside from a few more contracts at quotations, nothing special is doing. British and American prime bleach at seaboard is worth $1.25 per 100 lb., and Continental, $1.20. Lower grades are obtainable at a discount.

Copper Sulphate.—Demand shows some improvement, but, owing to re-sales, prices are easier at $5.25@$5.30 per 100 lb.

Arsenic.—Paris green makers are good buyers on the basis of $3.05 per 100 lb. for French, $3.25 for English, and $3.125 for both German and Spanish. Forward contracts can be made at less.

Acids.—There is a good undertone to this market, and as deliveries are seasonably active no complaint is heard.

We quote as below, per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l	$5.00@$5.50
Muriatic, 20°	1.60	Sulphuric, 50°, bulk, ton	13.50@20.00
Muriatic, 22°	1.75	Sulphuric, 60°	15.00
Nitric, 36°	4.50	bulk, ton	18.00@24.50
Nitric, 38°	4.75	Sulphuric, 66°	11.00
Nitric, 40°	5.00	bulk, ton	21.00@23 00
Nitric, 42°	5.37½		

Pyrites.—There is comparatively little activity in trade so long as winter continues, but importers are still chartering vessels. The latest fixture is 10s. 6d. ($2.62) from Huelva, Spain, to Charleston, S. C., which includes un-

loading charges, and one to New York at 9s. ($2.16). A cargo of 2,908 tons Pilleys Island pyrites was received at Philadelphia last week.

We quote domestic pyrites $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@52% sulphur, are quoted at 11@11.5c. per unit for lump, and 9.5@10c. for fines, delivered at Atlantic ports.

Brimstone.—No special demand. Spot best unmixed seconds have sold on basis of $22.50 per ton, while shipments are quoted at $22.37½@$22.50. Best thirds are about 50c. less. A new source of supply, rather a future possibility, is said to be the oil strata in Texas, which show a heavy impregnation of sulphur.

Sicilian Brimstone Market.—Messrs. Emil Fog & Sons, of Messina, write, under date of December 31, that there is no change in the firmness dominating the market. Arrivals from dissidents are becoming scarcer. The large trade to the Colonies in refined and sublimed sulphur, which was formerly done by Marseilles, has been taken by Catania. Even the French colonies and Algiers, despite the protective duty, now buy from Catania. We quote, per ton, f. o. b., as follows: Best unmixed seconds, in bulk, 82s.; best thirds, 79s. 9d.; current thirds, 78s.; refined block sulphur, 88s. 6d.@91s.; refined roll, 94s. 9d.@100s., and in sticks, 103s. 9d.@106s. 3d.; sublimed flowers, pure, 108s. 6d.; current, 99s. 9d., and commercial, 94s.; best seconds, ground, 89s. 6d.

Nitrate of Soda.—There is little new business offering at current quotations of $2.15 per 100 lb. for spot, and $2.025@$2.10 for futures, according to position.

Official statitics for the eight months—April to November—of the third combination year are as follows, in Spanish quintals:

	1902.	1903.		Changes.
Production	20,905,190	22,462,523	I.	1,557,333
Exports	19,374,810	20,673,801	I.	1,298,991
Consumption	17,282,865	17,405,240	I.	122,375
Vis. supply Nov. 30	20,287,764	21,244,394	I.	956,630

There are 96 *oficiñas* in the combination, of which 84 were working on November 30, 1903. According to agreement, the exports for the remaining four months of the fiscal year should amount to 11,826,189 qtl., which is 1,680,605 qtl. more than was reported in the corresponding period of the previous year.

Sulphate of Ammonia.—Gas liquor is quoted at $3.20@$3.25 per 100 lb., according to position.

Phosphates.—Trade is uninteresting, consisting principally of deliveries on urgent orders. No improvement need be looked for until a change in temperature is noticeable. Few export charters are being placed.

Prices for phosphates, per ton, are as follows:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla. hard rock, 77@80%....	$6.50@$7.00	$11.12@$12.09
land pebble, 68@73%..	3.75@ 4.00	7.70@ 8.05
†Tenn., 78@82%.....	4.00@ 4.25	10.80@ 11.40
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
73@74%	2.95@ 3.20	.....
‡So. Car. land rock.....	3.25	.....
river rock.....	2.75@ 3.00	5.75@ 6.88
Algerian 63@70%.....		
58@63%	.....	6.00@ 6.60
53@58%	.....	4.95@ 5.09
Tunis (Gafsa).....	.....	6.15@ 6.60
Christmas Isle, 80@85%.....	.....	12.38@ 13.61
Ocean Isle, 82@88%.....	.....	13.39@ 14.45
Somme, Fr., 70@75%.....	.....	10.15@ 10.33
Bordeaux, Fr., 60@65%.....	.....	7.50@ 7.66
55@60%	.....	6.33@ 6.47
Liege, Bel., 60@65%.....	.....	6.88@ 7.03

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

The statistical position of Florida high-grade phosphate rock in 1902 and 1903 is reported by Messrs. Auchincloss Brothers, as below, in long tons:

	1902.	1903.		Changes.
Production	476,110	423,872	D.	52,238
Exports	490,506	465,520	D.	24,986
Domestic shipments	2,104	2,352	I.	248
Total shipments	492,610	467,872	D.	24,738
Stocks, Dec. 31	171,450	127,450	D.	44,000

These figures vary but little from the estimates made in the JOURNAL for January 7.

A notable feature is the continued excess of shipments over production, resulting in a heavy reduction in stocks. Another interesting fact is that of the 60 plants in the field, 37 are owned by three companies, which rather indicates a gradual centralization of the industry. Equally noteworthy is the knowledge that only 7 of the 60 plants were idle in 1903, being the smallest number in years. Five plants were being built or removed to new ground during the year. Prices for rock advanced in 1903, but not enough to cover the higher cost of production.

METAL MARKET.

New York, Jan. 27.

Gold and Silver Exports and Imports,

At all United States Ports in December and Year.

Metal	December.		Year.	
	1902.	1903.	1902.	1903.
Gold:				
Exports.	$2,853,112	$1,464,656	$36,030,591	$44,346,834
Imports.	2,186,633	17,230,298	44,193,317	65,267,696
Excess	E. $668,476	I. $15,765,642	I. $8,162,726	I. $20,920,862
Silver:				
Exports.	5,546,875	5,079,244	49,272,954	39,189,933
Imports.	2,701,286	2,078,655	26,402,935	23,974,508
Excess	E. $2,845,589	E. $3,000,589	E. $22,870,019	E. $15,224,425

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending January 23 and for years from January 1

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$29,893	$180,331	$1,051,800	$11,235
1904	209,784	1,113,386	3,222,787	53,700
1903	20,905	583,629	1,012,436	105,362
1902	1,917,404	50,927	2,908,963	23,282

The amounts for the current year include shipments too late for last week's summary.

Business generally continues to show some improvement. The speculative markets have also been a little stronger.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending January 23 gives the following totals, comparison being made with the corresponding week of 1903:

	1903.	1904.
Loans and deposits	$890,448,100	$965,064,900
Deposits	912,812,100	986,303,300
Circulation	45,414,400	43,141,200
Specie	177,170,000	195,207,900
Legal tenders	77,448,000	77,440,600
Total reserve	$254,618,000	$272,648,500
Legal requirements	228,203,025	246,585,825
Balance surplus	$26,414,975	$26,062,675

Changes for the week were increases of $30,669,300 in loans and discounts, $45,034,700 in deposits, $13,528,800 in specie, $620,800 in legal tenders, and $2,890,925 in surplus reserve, a decrease of $635,800 in circulation.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'd—	$177,170,000	.....	$195,207,900	.....
England—	167,558,730	.....	162,848,705	.....
France—	501,761,170	$218,464,045	468,327,905	$220,341,875
Germany—	170,075,000	59,760,000	163,605,000	57,480,000
Spain—	71,965,000	98,600,000	72,800,000	95,220,000
Netherlands—	23,490,000	32,954,500	23,996,500	32,504,500
Belgium—	15,833,335	7,916,665	15,820,000	7,910,000
Italy—	84,660,000	10,400,000	109,480,000	16,550,000
Russia—	368,900,000	32,680,000	430,250,000	36,565,000
Austria—	231,290,000	61,695,000	232,395,000	61,660,000

The returns of the Associated Banks of New York are of date of January 23, and the others January 21, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Buyers have been holding off in expectation of lower prices, which condition, having materialized, considerable purchases of silver were made this week; but at present writing the market is dull at 25⅞d.

The United States Assay Officer in New York reports receipts of 63,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to January 14 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.		Changes.
India	£192,500	£564,789	I.	£372,289
China	.....	.....		.....
Straits	.....	38,103	I.	38,103
Total	£192,500	£602,892	I.	£410,392

Receipts for the week were £213,000 in bar silver from New York, £4,000 from Australia and £4,000 from the West Indies; total, £211,000; also £30,000 in Mexican dollars from the Straits and China. Shipments were £122,700 in bar silver to Bombay, £33,953 to Singapore, and £4,150 to Penang; total, £160,803; also £55,300 in Mexican dollars to Bombay.

Indian exchange continues strong, the Council bills offered in London having been taken at an average of 16.09d. per rupee. Buying of silver for government account has been stopped, but a good deal is still being taken for shipment to India by private parties.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.42	$0.44
Peruvian soles and Chinese.... pesos....	.41	.44
Victoria sovereigns	4.85⅓	4.87
Twenty francs	3.85	3.87
Spanish 25 pesetas	.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

January	Silver N. Y. Cts.	Silver London, Pence.	Copper Lake, Cts. per lb.	Copper Electrolytic, Cts. per lb.	Copper London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter N. Y., Cts. per lb.	Spelter St. Louis, Cts. per lb.
21	56⅝	26¼	12¼@12⅝	12⅜@12½	57¾	28¾	4.45@4.50	4.85	4.65
22	55⅝	25½	12¼@12⅝	12⅜@12½	56⅞	28¼	4.45@4.50	4.85	4.65
23	55⅝	25½	12¼@12⅝	12⅜@12½	....	28¼	4.45@4.50	4.85	4.65
25	55	25¼	12¼@12⅝	12¼@12½	56½	28¼@28⅝	4.45@4.50	4.85	4.65
26	55¾	25¾	12½@12⅝	12¼@12½	55¾	28½@28½	4.45@4.50	4.85	4.65
27	55⅞	25⅞	12¼@12⅝	12¼@12½	56⅝	28¾	4.45@4.50	4.85	4.65

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars: the price of electrolytic cathodes is usually 0.25c. lower than these figures

QUOTATIONS ON STERLING EXCHANGE.

January 21	4.8595	January 25	4.85⅞
" 22	4.86	" 26	4.85⅞
" 23	4.85⅞	" 27	4.8560

Copper.—We have again to report a very quiet market. While the exports continue large, consumers on this side remain rather apathetic. However, it is expected that at the lower values established, more interest will be shown in the article. The closing quotations are given as 12½@12⅝c. for Lake; 12¼@12½c. for electrolytic in cakes, wirebars or ingots; 12@12¼c. for cathodes, and 12@12⅛c. for casting copper.

The market for standard in London, which last week closed at £56 17s. 6d., opened on

Monday at £56 10s.; on Tuesday declined to £55 15s., but the closing quotations on Wednesday are cabled as £56 12s. 6d.@£56 15s. for spot, and £56 10s.@£56 12s. 6d. for three months.

Refined and manufactured sorts, we quote: English tough, £61@£51 10s.; best selected, £62 @£62 10s.; strong sheets, £71 10s.@£72; India sheets, £68 10s.@£69; yellow metal. 6⅜@6½d.

Exports of copper from New York, Baltimore and Philadelphia in the week ending January 26 were 5,525 tons, besides 42 tons matte. Since January 1 shipments have amounted to 30,945 tons copper and 42 tons matte. Germany and Holland together received 9,198 tons copper; Great Britain, 4,069 tons copper and 42 tons matte, and France, 5,562 tons; the balance going to various other countries. Imports for the week were 740 tons copper, making 1,724 tons since the first of the year, from Mexico and Great Britain.

Tin.—The firmer tendency prevailing last week was short-lived, and on Monday the market opened extremely flat at 28⅛c. Stimulated by a fair consumptive inquiry, the market in the meantime became somewhat firmer, and the closing quotations on Wednesday are given as 28½@28¾c. for spot and futures.

The foreign market, which last week closed at £127 7s. 6d., opened on Monday at £126, on Tuesday advanced to £127 12s. 6d., and the closing quotations on Wednesday are cabled as £127 12s. 6d.@£127 15s. for spot, and £128 2s. 6d@£128 5s. for three months prompt.

Lead has ruled quiet but steady throughout the week, without any special feature. The closing quotations are given as 4.45@4.50c. New York, and 4.37½@4.42½c. St. Louis.

The foreign market is somewhat easier, Spanish lead being quoted at £11 11s. 3d., and English at £11 3s. 9d.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of January 9, that the price of silver during the week has been 14 reales per oz. Exchange has gone up to 34.28 pesetas to £1. Local quotation for pig lead on wharf has been 62.75 reales per quintal, which, on current exchange is equal to £10 5s. per ton of 2,240 lb. f. o. b. Cartagena. Exports for the week were 508,087 kg. desilverized lead to London, 484,281 kg. pig lead and 1,695 kg. silver bars to Marseilles.

Spelter.—The market has ruled rather quiet, and the transactions have been nothing out of the ordinary. The closing quotations are given as 4.65c. St. Louis and 4.85c. New York.

The foreign market is very strong, good ordinaries being quoted £21 17s. 6d.@£22, and specials £22 2s. 6d.@£22 5s.

Silesian Spelter Market.—Herr Paul Speir, writing from Breslau, says that the Silesian zinc industry experienced a very satisfactory year, although the exports in 1903 were considerably less than in the previous year. The average prices on the old basis were about 400 marks per 1,000 kg. during the first half year, and 380 marks in the last half, equivalent respectively to 4.54 and 4.31c. per lb. The production during the first nine months of 1903 was 88,473 metric tons, against 87,215 tons in the corresponding period of 1902. There was a marked decline in the exports of sheet zinc, but the effect of this was counterbalanced by the increased demand in the home markets. Prices were steady throughout the year. The production by Upper Silesian manufacturers for the first nine months of 1903 was 30,488 tons, as compared with 31,781 tons in the nine months of the previous year. The zinc-white industry had a very satisfactory year, so far as demand was concerned, but prices were low on account of competition. In zinc dust the trade was poor during the first semester, but showed marked improvement after the month of August. Prices closed at about 41 marks per 100 kg. f. o. b. Breslau, which is equivalent to 4.6c. per lb.

Spanish Zinc Ore Market.—Mesrs. Barrington & Holt report from Cartagena, Spain, under date of January 9, that very little has been done during the week in zinc ore. Prices, however, are firm, and miners are asking more than they have been for ores, especially blende.

Antimony.—There has been a better consumptive inquiry, and the market is somewhat firmer in tone. The closing quotations are given as 7@7¼c. for Cookson's; 6½@6¾ for Hallett's, and 5⅝@5⅞c. for U. S., Japanese, French, Hungarian, Italian and Chinese.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Demand continues steady, and the price remains at $19 per oz.

Messrs. Eimer & Amend, of New York, quote prices for platinum in manufactured forms, as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 75c. per gram; platinum crucibles and dishes, 77c. per gram; perforated wire, like cones, Gooch crucibles, etc., 82c. per gram.

Quicksilver.—The New York price is $45.50 per flask for large lots, while a slightly higher figure is quoted for smaller orders. The San Francisco quotations continue at $44@$45 per flask for domestic orders and about $41.50 for export. The London price is £8 5s. per flask, with the same quotation asked by second hands.

Cadmium.—According to Herr Paul Speier metallic cadmium was in good demand throughout 1903. Metal containing 99.5 per cent cadmium sold at from 675 to 700 marks per 100 kg., delivered in Berlin.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb		Per lb
No. 1. 99% ingots	33@37c.	Ferro-Tungsten (37%)	38c.
No. 2. 90% ingots	31@34c.	Magnesium, pure (N. Y.)	60c.
Rolled Sheets	4c. up	Manganese	$2.75
Alum-bronze	20@23c.	Mangan'e Cop. (20% Mn)	32c.
Nickel-alum	33@39c.	Mangan'e Cop. (30% Mn)	38c.
Bismuth	$2.10	Molybdenum (Best)	$1.82
Chromium, pure (N. Y.)	80c.	Phosphorus, foreign	45c.
Copper, red oxide	50c.	Phosphorus, American	70c.
Ferro-Molybde'm (50%)	$1.25	Sodium metal	50c.
Ferro-Titanium (10%)	90c.	Tungsten (Best)	62c.
Ferro-Titanium (20@25%) N. Y.	55c.		

Variations in price depend chiefly on size of order.

Missouri Ore Market. Jan. 23.

(From Our Special Correspondent.)

Pride shaft, which has produced good grade

The highest price paid for zinc ore delivered during the week was $37 per ton, one lot that sold at $38 not being loaded this week. The assay price for choice ore remains unchanged at $34 per ton of 60% zinc, but some of the least desirable ore was purchased on a basis of $31, or $1 per ton lower than last week. Buyers for the Grasselli Chemical Co., with offices at Cleveland, Ohio, have entered this field for ore. There is a growing belief that this company is controlled by the Standard Oil interests, and that the primary object is to produce acid for refining oils. It will have the longest haul of any of the smelters using ore from the Joplin district.

Lead sold the past week as high as $60.50 per ton. Just two car-loads were reported sold at this price; several car-loads brought $58.50, but the Picher Lead Co. and the Galena Lead Co. paid only $57.50. Sales for the week were as follows:

	Zinc lb.	Lead lb.	Value.
Joplin	2,065,530	290,700	$43,470
Webb City-Carterville	1,635,520	399,030	36,000
Galena-Empire	988,200	152,800	19,710
Duenweg	379,810	152,000	10,595
Aurora	583,980	14,490	9,205
Prosperity	284,940	133,710	7,865
Alba-Neck	375,750	.....	6,575
Badger	201,220	1,960	3,375
Oronogo	190,060	4,110	3,025
Carthage	145,690	.....	2,475
Granby	183,000	6,500	1,945
Carl Junction	81,430	.....	1,465
Central City	67,130	14,750	1,300
Cave Springs	58,670	5,480	1,125
Spurgeon	41,340	70,080	2,285
Zincite	55,150	1,020	965
Totals	7,337,420	1,246,630	$151,380

Zinc value, the week, $115,720; four weeks, $569,895.
Lead value, the week, 35,660; four weeks, 136,135.

The shipments of the past week aggregated only 3,670 tons of zinc ore, a decrease of 718 tons from the previous week, but the lead ore shipments were 21 tons larger. Compared with the same week of last year the shipment was less by 1,183 tons of zinc, but the lead shipment was increased 92 tons. Compared with the first four weeks of last year there is shown a gain of 917 tons of zinc, 595 tons of lead and of $97,176 in value.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903	1904.	1903.	1904.	1903.	1904.
Jan...	28.33	....	4.075	.....	4.865	....
Feb..	29.43	....	4.075	.....	5.043	....
Mar..	30.15	.....	4.442	.....	5.349	....
April.	29.81	.....	4.567	.....	5.550	....
May .	29.51	.....	4.325	.....	5.639	....
June .	28.34	.....	4.210	.....	5.697	....
July..	27.68	.....	4.075	.....	5.662	....
Aug..	28.29	.....	4.075	.....	5.725	....
Sept..	26.77	.....	4.243	.....	5.688	....
Oct...	25.92	....	4.375	.....	5.510	....
Nov..	25.42	.....	4.218	.....	5.388	....
Dec...	27.41	.....	4.162	.....	4.731	....
Year	28.09	.....	4.237	.....	5.400	....

NOTE.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.681c.; for March, 5.174c.; for April, 5.375c.; for May, 5.469c.; for June, 5.537c.; for July, 5.507c; August, 5.55c., September 5.514c.; for October, 5.35c; for November, 4.886c; for December, 4.556c; for the year, 5.191 cents.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	12.159	.....	12.361	.....	53.52	.....
Feb...	12.778	.....	12.901	.....	57.34	.....
Mar..	14.416	.....	14.572	.....	63 85	.....
April.	14.454	.....	14.642	.....	61.12	.....
May ..	14.435	.....	14.618	.....	61.73	.....
June .	13.942	.....	14.212	.....	57.30	.....
July..	13.094	.....	13.341	.....	58.64	.....
Aug..	12.962	.....	13.159	.....	58.44	.....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12.813	.....	56.30	.....
Dec. .	11.952	.....	12.084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars: prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London. Pence.	N. Y., Cents.	London Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan. .	25.62	55.56	21.98	45.57	.....	.....
Feb. .	25.41	55.09	22.11	47.89	.....	.....
Mar..	25.00	54.23	22.49	48.72	.....	.....
April.	24.34	52.72	23.38	50.56	.....	.....
May..	23.71	51.31	24.89	54.11	.....	.....
June .	24.17	52.36	24.29	52.88	.....	.....
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.45	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
Alaska-Mexican	Jan. 18	.10	18,000	591,381
Alaska-Treadwell	Jan. 18	.37½	75,000	5,350,000
†Allis-Chalmers, pf.	Feb. 1	1.75	350,000	3,213,750
†Amalgamated Copper.	Feb. 29	.50	769,430	23,503,837
Cambria Steel	Feb. 15	.75	675,000	7,125,000
†Camp Bird, Colo.	Feb. 6	.18	240,000	1,115,304
Central Oil, W. Va.	Feb. 1	.25	15,000	167,500
Consolidation Coal, Md.	Feb. 1	4.00	410,000	6,946,650
Fairmont Coal, W. Va.	Feb. 1	2.00	240,000	240,000
Jeff. & Clear. C.&I., p.	Feb. 15	2.50	37,500	637,500
†Nat'l Carbon, pf.	Feb. 16	1.75	78,750	1,653,750
Quincy Copper	Feb. 25	2.50	250,000	14,370,000
Somerset Coal, Pa.	Feb. 1.	2.00	80,000	80,000
†U. S. Steel Corp., pf.	Feb. 15	1.75	3,614,417	96,491,663

* Monthly. † Quarterly. ‡ Semi-annually.

ASSESSMENTS.

Company	Delinquent.	Sale.	Amount.
Andes, Nev.	Feb. 12	Mar. 4	.10
Bullion, Nev.	Feb. 18	Mar. 8	.05
Gould & Curry, Nev.	Feb. 8	Feb. 26	.10
Grape Vine Canyon, Cal.	Feb. 15	.....	.05
Jenny Lind, Cal.	Feb. 6	.....	.01½
Oswego, Cal.	Feb. 10	.....	.02
Sumdum, Alaska	Feb. 23	.....	.10
Shenandoah, Nev.	Feb. 15	.....	.02
Tonopah-Monarch, Nev.	Feb. 12	.....	.01
Utah Con., Nev.	Feb. 2	Feb. 23	.10

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	Jan. 20 H.	Jan. 20 L.	Jan. 21 H.	Jan. 21 L.	Jan. 22 H.	Jan. 22 L.	Jan. 23 H.	Jan. 23 L.	Jan. 25 H.	Jan. 25 L.	Jan. 26 H.	Jan. 26 L.	Sales.
Acacia														
Alpha	1					10								200
Amalgamated, c	100	50⅝	49¾	51¼	49⅛	51⅛	50⅛	51¼	50⅛	51⅛	50¼	50⅝	49¾	254,040
Anaconda, c	25			76		76⅛		76¼	76	75		74		1,350
Anaconda, g	5													
Andes, s	7	32		30				33						600
Belcher, s	3									3¼	33			400
Best & Belcher, s	25													
Brunswick, g	5	06				06¼	06			06		06		1,800
Bullion, s	1					11		13	12					900
Caledonia, s	1	95						80						350
Chollar, s., g	2½			21								22		322
Confidence	3									1.00		1.10		300
Con.Cal.&Va., g.s.	2½	1.69		1.65		1.65		1.65		1.65		1 65	1.60	1,214
Cripple Creek, g	1											10		1,000
Crown Point	2½	28		23										600
Daly, g. s	20									2.00				40
Elkton, g	1			60				55		63	62	63		900
El Paso, g	1	60												500
Gold Dollar, g												06½		500
Gould & Curry	1											35		100
Greene Con., c	10	13¼	12⅞	12⅝	12⅛	12¼	12	12⅞	12⅛	12	11⅛	13¼	11⅝	11,775
Hale & Norcross	3			65								75		200
Homestake, g	100													
Horn Silver	20					1.15								60
Isabella, g	1													
Jack Pot	1													
Justice, s	2													
Leadville, s. l	10			04										200
Little Chief, g. s	50													
Mexican, s	3	1.75		1.85				1.85				1.75		70
Mollie Gibson, g	5													
Moon Anchor, g	5													
Moulton	25											20		300
Occidental, s	3													
Ontario, s. l	100									4.50				150
Ophir, s	3	4.25		4.50	4.35	4.85		4.35	4.10	3.65		4.20		1,050
Overman, s	2													
Pharmacist, g	1					03½	03	04						2,500
Phœnix, g	1	14	13			14		14				13	10	3,300
Portland, g	1	1.50		1.55	1.50			1.50		1.55				1,000
Potosi, s	1	22		22	21			22		23				1,100
Quicksilver, Pf	100	6.00												100
Savage, s	3	55	54			60						58		600
Sierra Nevada, s	3													
Silver Hill, g. s	1	83	82			80				79				400
Small Hopes, g. s	20			30										100
Tenn., c	25									28				100
Union Con., g. s	1			90		90	89					81	80	850
Union Copper	25	⅞	⅛	⅞		01	⅞	01	1/16	⅞		1/16	⅞	8,950
United, com., c	100													
Utah, s	1													
White Knob, c	10			08¾		8¾		08		08½	07¾	08		700
Work	1											08		1,500
Yellow Jacket, s	3													

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 300,817 shares. † Ex-dividend.

COLORADO SPRINGS (By Telegraph).

Company.	Jan. 25. H.	Jan. 25. L.	Jan. 26. H.	Jan. 26. L.	Company.	Jan. 25. H.	Jan. 25. L.	Jan. 26. H.	Jan. 26. L.
Acacia	.09¼	.07¾	.09	.08	Jack Pot	.07	.06¾	.93	.07
Am. Con					Keystone	.05	.04⅜	.05	.04⅜
Anaconda	.15	.13¼	.20	.15	Last Dollar	.50	.40	.50	40
Colo. City & M					Lexington	.05½	.05	.05	.04⅞
Cripple Ck Con	.09¼	.09	.08¾	.09	Little Puck	.04	.03½	.03¼	.03
C. K. & N	.20	.14	.19	.15	Mollie Gibson	.06	.05	.06	.05
Doctor-Jack Pot	.09	.07½	.10	.08	Moon Anchor	.11	.09⅝	.10½	.10
Elkton Con	.56¾	.56	.57	.56	New Haven	.04½	.04	.04⅜	.04⅛
El Paso	.62	.61½	.62½	.62	Old Gold	.09½	.09	.09⅛	.09
Gold Dollar Con	.05¾	.05⅝	.05⅜	.05½	Pharmacist	.05¼	.05	.05	.04⅜
Gold Sovereign	.05	.04⅝	.05	.04¾	Pinnacle				
Golden Cycle	.58	.56½	.58	.57	Portland	1.80	1.57	1.80	1.50
Golden Fleece					Vindicator	.70	.60	.61	.60
Isabella	.11¼	.10½	.11¼	.11	Work	.07¼	.07¼	.07¼	.07

COLORADO SPRINGS, COLO.

†Company.	Par Val	Jan. 16 H.	Jan. 16 L.	Jan. 18 H.	Jan. 18 L.	Jan. 19 H.	Jan. 19 L.	Jan. 20 H.	Jan. 20 L.	Jan. 21 H.	Jan. 21 L.	Jan. 22 H.	Jan. 22 L.	Sales
Acacia	$1	.08	.07	.08	.07	.08	.06⅞	.08½	.08	.08¼	.08	.08¼	.08	2,000
American Con	1													
Anaconda	5	.11½	.10½	.11		.11		.11¼	.08	.12	.11½	.12		4,000
Colo. City & M	1	.01½	.01	.01		.02	.01¾	.02	.01½	.02¼	.02¼	.03	.02	1,000
C. K. & N	1	.13	.12	.13	.12¼	.12½	.12	.12	.11¾	.13	.10	.15	.14	7,000
Cripple Ck. Con	1	.04¾	.04¼	.04¼		.06	.04¾	.05½	.05¼	.06¾	.06⅝	.07¾	.07½	26,000
Des Moines	1	.02		.02	.01	.02	.01			.02	.01½	.02¼	.01½	1,000
Doctor Jack Pot	1	.05½	.05¼	.06	.05	.06	.05½	.05½		.08	.05¼	.09	.06½	2,100
Elkton Con	1	.58	.55	.53½		.55				.57¼	.56¾	.57	.56½	5,000
El Paso	1	.61½	.60½	.61½	.60¼	.60¾	.60¼	.60¾	.60¼	.61¾	.61¼	.61	.59	24,500
Gold Dollar Con	1	.04¼	.04	.04½	.04⅜	.04⅝	.04¼	.04¾	.04⅜	.05¼	.05½	.05¾	.05¼	10,000
Gold Sovereign	1	.04¾	.04	.04⅜	.04	.05	.04⅛	.04¾	.04¼	.04⅝	.03⅞	.04¾	.04⅛	18,000
Golden Cycle	1	.60	.58	.60	.56	.59	.57½	.57		.57		.59	.57	1,000
Golden Fleece	1	.05		.05		.05		.05		.05		.06		
Hart	1	.02¾	.02⅛	.02⅞	.02	.03½	.02⅛	.03⅛		.03½	.03	.03¼	.02⅞	7,000
Isabella	1	.10		.10		.11	.10	.11	.10	.11	.10	.11	.10	3,500
Jack Pot	1	.04⅝		.05	.04½	.05	.04½	.05	.04½	.05¼	.04¾	.05¼	.05	6,200
Keystone	1	.03⅜		.04	.03¾	.04⅛	.03⅞	.04⅛	.03⅞	.04⅜	.04	.04⅜	.04¼	15,000
Last Dollar	1	.50		.50		.45		.50		.45		.50		
Lexington	1	.04½	.04	.04¼	.04	.04½	.04	.04½	.04¼	.04½	.04⅜	.04⅝	.04½	3,000
Little Puck	1	.02	.01½	.01⅞		.01⅞		.02	.01¾	.02⅛	.01⅝	.02¼	.02¼	22,000
Mollie Gibson	1	.05		.05⅜	.05	.05½	.05	.05½	.05	.06	.05	.06	.05	2,000
Moon-Anchor	5	.09½	.09⅛	.09⅝	.08⅞	.09¼	.09¼	.09¾		.09⅝	.09	.09¼	.08¾	10,300
New Haven	5	.02¾	.02	.02⅞	.02⅛	.03	.02½	.03	.02⅛	.02⅞		.03¼	.03⅜	1,000
Old Gold	1	.10	.08⅜	.08⅞		.09¼	.08¾	.09⅛	.08⅝	.09½	.08⅝	.09½	.08⅜	
Pharmacist	1	.03½	.02⅞	.03½		.09¾	.03½	.04	.03⅛	.04⅛	.04	.04⅛	.04	7,000
Pinnacle	1	.03		.03½		.03		.03½	.02¾	.04⅜	.02⅛	.03½		3,000
Portland	1	1.50	1.35	1.50	1.36	1.30		1.53	1.35	1.55	1.35	15.3	1.50	430
Vindicator Con	1	.65	.55	.70	.55	.70	.55	.70	.55	.68	.53	.67	.62	500
Work	1	.06	.05½	.05½	.05¼	.06¼	.06	.06¾	.06¼	.07	.06¾	.07¼	.07	24,000
	1													

Total sales, 203,500 shares.

SAN FRANCISCO (By Telegraph).

Company.	January 25.	January 26.	Name of Company.	January 25.	January 26.
Belcher	.32	.31	Justice	.08	.08
Best & Belcher	1.65	1.65	Mexican	1.65	1.55
Caledonia	.92	.93	Occidental Con	1.00	.90
Challenge Con	.25	.25	Ophir	4.10	3.95
Chollar	.23	.22	Overman	.26	.25
Confidence	1.10	1.05	Potosi	.22	.20
Con. California & Virginia	1.55	1.50	Savage	.52	.50
Con. Imperial	.03	.03	Sierra Nevada	.65	.60
Crown Point	.23	.23	Union Con	.82	.81
Gould & Curry	.35	.35	Utah Con	.13	.13
Hale & Norcross	.75	.75	Yellow Jacket	.14	.42

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Jan. 20 H.	Jan. 20 L.	Jan. 21 H.	Jan. 21 L.	Jan. 22 H.	Jan. 22 L.	Jan. 23 H.	Jan. 23 L.	Jan. 25 H.	Jan. 25 L.	Jan. 26 H.	Jan. 26 L.	Sales
Allis-Chalmers	$100			7½		7				7⅛				400
Preferred	100	57½		58		58								300
Am. Agr. Chem	100													
Preferr d	100	75⅞												25
Am. Sm. & Ref	100			49	48¾	49½	48⅞	49	48¾	50⅛	48⅞	50⅝	48⅜	25,550
Preferred	100	90		91	90⅝	91		91⅛	91¼	91¾	91	92	91¾	4,172
Am. Steel Fdy	100													
Preferred	100					45				38½				225
Col. Fuel & I	100			31	30	32½	30	31½	31⅜	31	30½	30½		3,901
Col. & H. C. & I	100			14¼	14¼	14		14	13½	14		16¾	14⅛	8,680
Crucible Steel	100	4		3¾		4		4	3⅞	4				675
Preferred	100	28	27¼	27½	26⅝	27¾	27⅝	28½	27⅞	28¾	27¾	27½	27	2,611
Mong. R. Coal	50													
Preferred	100	25		26	25								25	1,252
National Lead	100	16	15½	16½	16	16¾	16¼	16½	16¼	16¼	16	15⅞		3,900
Preferred	100											80⅛		100
Phila. Nat. Gas	100	41	40¾	42⅜	41	44	42					42¼	42	672
Preferred	100					45½								12
Pittsburg Coal	100	11⅜	11⅛	11½				11⅛	11⅜	12	11⅝	14½		2,225
Preferred	100	48⅜	48	48¼		49	48¼	48⅜	48¼	49¾	48¾			1,548
Republic I. & S	100	7		7½	7⅛	8	7⅞	8⅜	8¼	8¾	8	8		13,300
Preferred	100	43	42⅝	46	43	47	46	49¼	47	49	47¼	47	46½	11,700
Sloss-Shef S. & I	100	34½	34	35½	34½	38	35⅝	38½	38¼					2,925
Preferred	100									79¼	78⅛			200
Standard Oil	100	665	663	668		667		674	669	670	665			159
Tenn. C.I. & R.R	100	38¾	38	39½	38½	40½	39⅛	40¼	39¾	40	39	40½	38¾	24,405
U.S. Red. & Ref	100													
Preferred	100													
‡U.S.Steel Corp	100	11⅜	11	11⅞	11¼	12½	11¾	12¼	12	12½	11⅞	11⅜	11¼	115,113
Preferred	100	58½	57⅞	59	51¾	60	59½	59⅝	59	59⅝	57⅝	58⅝	57½	224,650
Va.-Car Chem	100	29¼	29	28⅜	29	32½	29½	32¼	31½	34¼	32¼	33¼	32¼	15,011
Preferred	100					105	104					106¾		430
Va. I. Coal & Coke	100													
W'house E.&M.pf														

†Ex-dividend Total sales, 464,121.

BOSTON, MASS.

Company.	Par val	Jan. 20 H.	Jan. 20 L.	Jan. 21 H.	Jan. 21 L.	Jan. 22 H.	Jan. 22 L.	Jan. 23 H.	Jan. 23 L.	Jan. 25 H.	Jan. 25 L.	Jan. 26 H.	Jan. 26 L.	Sales.
AdventureCon., c	$25	3		2¾	2½	2½				03		02¾	02¼	600
Aetna, q	5									20				50
Alouez, c	25	4¾	4⅝	5	4¾	4⅜	4¾							906
Amalgamated, c	100	50⅝	49⅞	51⅛	49⅞	51⅛	50⅛	51⅝	50⅜	51⅝	50⅜	50¾	49¾	30,275
Am. Gold Dredg	5													
Am. Z., L. & Sm	25	10								10		10½	10	275
Anaconda, c. s	25													
Arcadian, c	25	90				100	90	100				90		800
Arnold, c	25													
Atlantic, c	25	8¾	8¼	8		8¾	8½			8½		8½		340
Bingham Con	50	23½	22½	24	23½	23¾	23⅜	23⅝	23½	23¾	23½	23¼	23	3,737
Bonanza Dev. g	10	45												100
British Col., c	5													
Calumet & Hecla	25	445	440	448		450	445	450		455	450	455	450	59
Centennial, c	25	17½	17	17½	17	17		16	15½	16	15⅛	15¾	15	4,540
Central Oil	25							7¼		7¾	7			250
Con. Mercur, g	5			67½	65	65		65				65		3,040
Copper Range	100	48¾	45⅝	48¼	45¼	48¼	45½	48¼	45½	48	45⅛	45½	44⅞	4,219
Daly West, g. s. l	20	35	34½	34¾		35		34¾	34½	35		34½	35	592
†Dominion Coal	100	66	65½	67½		67½	67	66¾		68	62	63	61	1,100
Preferred	100					113	112	112				109		82
Dominion I. & S	100	8½		8½		8⅝	8½			8⅝				385
Elm River, c	12									2¼				100
Franklin, c	25	8½	8⅜			8½				8½	8⅜	8⅜		706
Granby Con	10	3½		3¾	3	3¾		3½		3¾		3½		5,555
Guanajuato Con	5	85				87½	85	85				85	80	680
Isle Royal Con	25	9	8	8¾	8	9	8½			9½	9	9	8¾	7,040
Mass Con., c	25	4½		4⅞	4¾	4½		4½				4¾		600
Mayflower, c	25					87½	85							250
Michigan, c	25			6¼	6	6½	6¼	6				6		525
Mohawk, c	25	39	38½	38½		38½		39	38½	38½	38	37½		712
Mont. Coal & C	25	2¾		4	3	3⅞	3¼	3⅞	3½					3,535
Mont'l & Boston	5													
New Idria, q	5									10				3
Nova Scotia St	100													
Preferred	100													
Old Colony, c	25	1		1				1¼		1 ¼		1		460
Old Dominion, c	25	11¾	11¼	12	11½	11¾	11¼			11⅞	11½	11	10½	1,275
Osceola, c	25	60½	60¼	61	60½	61		61		61¾	60	60	59½	584
Parrot, s. c	10	24	23	23¼		23½				23	2¾	2¾		279
Phœnix Con, c	25	3	2¾							3				305
Quincy, c	25	95		95		96	95	96		97½	96			101
Rhode Island, c	25			1										100
Santa Fe, g. c	10	2⅞	2	2¼	2	2				2⅜				1,900
Shannon, c	10	9	8½	9⅛	8¾	9		8¾	8¾	9	8½	8¾	8¼	6,840
Tamarack, c	25					115		110	109	114	112	110		105
Tecumseh, c	25													
Tennessee, c	25													
Trinity, c	25	5		5½	5	5		5		5½	5	5		1,095
United c	100													
United States, g	10	22	20¾	22	21¾	21½	21	21¾	21½	21¾	21	21¼	20⅝	11,945
U. S. Coal & Oil	25	10¼	9½	10⅛	9¾	9¾		9¾	9½	10	9½	9¾	9¼	4,631
Utah Con., g. c	5	34½	33⅞	34½	33⅞	34¼	33¾	33¾	33¼	34⅛	33½	34	33¼	5,683
Victoria, c	25	3¾		3¾	3½			3¾	3¾			3¼	3¾	390
Winona, c	25			7		7				7				190
Wolverine, c	25	72½	72	73½	73	73		73½	72¼	73½	73	72½	72	206
Wyandot, c	25	1⅛				1						1		250

†Ex-dividend. ‡Assessment Paid. Total sales, 137,345 shares.
c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver.

SAN FRANCISCO.*

Company.	Location.	Jan. 15 H.	Jan. 15 L.	Jan. 16 H.	Jan. 16 L.	Jan. 18 H.	Jan. 18 L.	Jan. 19 H.	Jan. 19 L.	Jan. 20 H.	Jan. 20 L.	Jan. 21 H.	Jan. 21 L.	Sales
Central Eureka	Cal					.85								113
Esperanza	Nev													
Golden Anchor	Nev	.27										.15	.13	700
Golconda	Ore													
MacNamara	Nev	.10		10				.10				.12		1,350
Mont. Tonopah	Nev	1.25	122½	1.25		1.30	1.25	1.30	1.25	127½		1.30	127½	3,700
South Eureka	Cal													
Ton. Belmont	Nev	.65		.68	.65	.70	.60	.69	.65	.68	.68	.68	.65	6,000
Ton. Midway	Cal			.43	.40	.40		41	.40	.41		.41	.40	3,200
Ton. Mg. Co	Nev							5.50		5.50		5.50		500
Ton. North Star	Nev			.34	.31	.38	.35	.34	.33			.35	.34	7,500
Ton. Superior	Nev					.60								200

San Francisco and Tonopah Mining Exchange.
Total sales, 23,263 shares.

STOCK QUOTATIONS

MEXICO.* Jan. 15

Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Durango:			
Ca. Min. de Penoles..	2,500	$3,800	$4,100
San Andres de la Sierra	200	10,000	
Guanajuato:			
Angustias, Pozos	2,400	50	53
Cinco Senores y An., aviadoras	2,000	70	75
Cinco Senores y An., aviada	400	73	75
Providencia, San Juan de la Luz	6,000	65	70
Queensland y Australia	300	68	75
Guerrero:			
Delfina, 1st serie	2,500	35	40
Delfina, 2nd serie	2,500	30	40
Garduno y Anexas	7,200	40	50
Hidalgo:			
Amistad y Condordia	9,600	73	80
Carmen, aviada	1,100	120	150
Guadalupe Fresnillo Mill	1,000	100	250
Guadalupe Fresnillo Mine	1,400	70	80
La Blanca, aviadora	1,536		
La Blanca, aviada	768		
La Reina y An., aviadora	5,000	12	15
Luz de Maravillas, aviadas	1,100		20
Maravillas y An., aviador	1,680	120	140
Maravillas el Lobo	1,000	130	180
Palma y An., aviador	1,800	10	12
Real del Monte	2,554		
Refugio, aviada	12,800	5	7
Santa Anay An., aviadora	1,800	95	100
Santa Anay An., aviada	600	30	40
Sta. Gertrudis y An., aviadas	9,600	13	15
Sta. Gertrudis y An., aviadora	28,800	83½	84
Santo Tomas Apostol aviadoras	5,100	2	3
San Felipe de Jesus, aviadora	3,000	18	20
San Felipe de Jesus, aviada	1,200	6	10
San Rafael y An., Trompillo	1,200	1,690	1,715
San Rafael y An., aviada	1,200	690	700
Soledad, aviada	960	680	710
Sorpresa, aviada	960	340	350

Name of Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Mexico:			
Alacran	2,400	40	50
Aldebarren	2,000	45	60
Buen Despacho	3,000	55	65
Dos Estrellas	3,000	1,700	1,800
La Esperanza (El Oro.)	3,000	1,500	1,500
La Reformia, aviadores	2,000	33	38
Providencia, pagadoras	1,600		
Providencia, liberadas	900		
Santa Ana, Esperanza	2,400	90	
Michoacan:			
Luz de Borda, aviadora	3,000	62	80
Luz de Borda, aviado	1,000	25	38
Santiago y An., Tlal.	4,000	6	11
Nuevo Leon;			
La Fraternal	1,000	580	620
Norias de Bajan	1,000	880	920
San Luis Potosi:			
Concepcion y An	3,000	80	85
El Barreno, aviadora	2,000	40	45
Sta. Maria de la Paz	2,400	180	185
San Diegoy Annexas	2,400	10	14
Zacatecas:			
Asturiana y An	2,500	60	65
Candelaria y Pinos	2,500	130	140
Cubiertas	2,400		
Esperanza y An	2,400	6	8
Lourdes	2,500	25	32
Luz de Minillas, pagadoras	2,000	15	30
Nueva Quebradilla, aviadoras	2,400	95	105
Nueva Quebradilla, aviadas	600	70	80
San Carlos y Annexas	2,500	120	125
Sta. Maria de Gaud	2,500	60	65
Miscellaneous:			
Bartolome de Medina	2,000	78	80
Guadalupe Hacienda	20,000		
La Luz Hac. (Pachuca.)	3,750		
La Reina (Chihuahua.)	192		
Naica (Chihuahua.)	100	11,000	13,000
Natividad (Oaxaca) aviadora	1,800	1,000	1,050
Natividad (Oaxaca) aviadas	600		
San Francisco Hac	6,000	69	75
Santa Ana Huantla Morelos	4,000		
Union Hacienda	3,000	215	230

*Values are in Mexican currency.

TORONTO, ONT. Jan. 23

Company.	Par val	Prices. High.	Prices. Low.	Sales
Black Tail, g	$1	.04	.02	
Cariboo-McKin	1	.06	.02	
Cariboo Hydr	1	.70		
Center Star, g. s	1	.24	.22½	
Crows Nest, C.C	100	2.60	2.00	
Dominion Coal	100	.68	.65	25
Dominion S. & I	100	.09	.08½	
Fairview, g. s	1	.04	.03	
Giant, g. s	1	.03	.01	
Deer Trail, g. s	1	.02	.01	
Iron Mask, g. s	1	.06		
Morrison, g. s	1	.04	.02	

Company.	Par val	Prices. High.	Prices. Low.	Sales
Granby Smelter	$10	4.30	3.75	
Mountain Lion, g	1	.18	.14	
North Star, g. s	1	.08	.07	
Nova Scotia Steel	100			
Payne, s. l	1	.16	.12	
Rambler Carib	1	.35	.25	
Republic, g	1	.03		
St. Eugene, g. s	1	.40	.30	
Virtue, g. s	1	.08	.06	
War Eagle Con	1	.12	.10	
Sullivan, g. s	1	.07	.03	
Winnipeg, g. s	1	.04		
Wonderful, g. s	1	.03		

g—Gold. l—Lead. s—Silver. Total sales, 25.

SALT LAKE CITY.* Jan. 16

Company	Par Val	High	Low	Sales.
Ajax	10			
Butler Liberal				
Carisa	1	.11½	.10	7,795
Century	1	.94	.90	2,300
Con. Mercur	1	.63¾	.60½	4,450
Daly	5			
Daly-Judge	1	3.75	3.15	1,220
Daly West	20	34.75	34.00	170
Dalton				
Grand Central	1	3.50		450
Ingot	½	.02½	.02½	3,000
La Reine	1	.02½		4,000
Little Bell	10	.25		100
L. Mammoth	1	41.00		200
Mammoth	25	1.15	1.10	650
May Day	¼	.07½	.07½	5,500

Name of Company	Par Val	High	Low	Sales.
M. Washington	½			
Naildriver	2	.62½		100
N. Y. Bonanza	1	.16	.10¾	3,100
Northern Light	5			
Richm'd Ancda	1			
Sacramento	5	.21¾	.20½	11,500
Silver King				
Silver Shield	20	.03½	.03½	1,400
Star Con	1			
Tetro	1	.28½		5,000
Uncle Sam Con	1	.23¾	.22½	10,900
Utah	1			
Valeo	1			
Victor Con	1	.06	.04½	1,200
Wabash	1	.06	.05¼	8,500
Yankee Con	1	.41	.40	2,100

*By our Special Correspondent. All mines are in Utah. Total sales, 68,485 shares.

PHILADELPHIA, PA*

Name and Location of Co.	Par val.	Jan. 20 H.	Jan. 20 L.	Jan. 21 H.	Jan. 21 L.	Jan. 22 H.	Jan. 22 L.	Jan. 23 H.	Jan. 23 L.	Jan. 25 H.	Jan. 25 L.	Jan. 26 H.	Jan. 26 L.	Sales
Am. Cement	$10					7⅛		7¼	7⅛	7				280
Cambria Iron	50			48										†
Cambria Steel	50	21	20⅜	20⅞	20⅜	21¼	20½	21¼	20¾	21¼	20¾	21	20⅞	9,701
Pa. Steel, pfd	100			73½										100
Susq. I. & S.	5											¾	⅝	100
United Gas I.	50	87¾	87¼	89½	88	89¾	88¾	88⅝	88¼	89⅛	88¼	88		5,700
Lehigh Nav'n	50	64		65½	65	67								247
Philadelphia	50	41⅜	41	42½	41½	43	42¼	42¾	42¾	42¾	42¼	42⅛	42	13,859
U.S. Steel	100	11¼		11⅞	11⅝	12¼	11¾	12¼	12⅛	12	11½	11⅝	11⅜	10,070
U.S. Steel. pf.	100	58	57¾	58⅞	58	60	59½	59⅝	59⅜	59¼	58	52½	57⅝	11,331

†Ex-Dividend Total sales 51,393.

LONDON. Jan. 12

Company.	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Latest dividend. Date.	Quotations. Buyers. £ s. d.	Quotations. Sellers. £ s. d.
American:						
Alaska-Treadwell	200,000	5 0 0	1 6	Jan., 1904	4 10 0	4 15 0
Anaconda	1,200,000	5 0 0	2 0	Nov., 1903	3 16 3	3 18 9
Camp Bird	820,000	1 0 0	9	Feb., 1904	1 5 0	1 6 3
Copiapo	112,500	2 0 0	6 10	May, 1903	17 6	1 2 6
De Lamar	80,000	1 0 0	2 9	Oct., 1903	10 0	12 6
El Oro	1,080,000	1 0 0	9	Dec., 1903	1 5 0	1 7 6
Frontino & Bolivia	128,662	1 0 0	3 0	July, 1901	6 3	8 9
Le Roi	200,000	5 0 0	5 0	Nov., 1899	12 6	15 0
Le Roi No. 2	120,000	5 0 0	5 0	May, 1902	16 3	18 9
Montana	657,128	1 0 0	6	April 1899	1 0	1 6
Standard	500,000	4 0	2½	Sept., 1903	3 0	4 0
Stratton's Independence	1,000,007	1 0 0	6	Dec., 1903	4 9	5 3
St. John del Rey	546,285	1 0 0	6	Dec., 1903	14 0	15 0
Tomboy	300,000	1 0 0	1 0	June, 1902	1 12 6	1 17 6
Utah	300,000	1 0 0	6 3	Jan., 1904	6 15 0	7 0 0
Ymir	200,000	1 0 0	1 0	Mar., 1902	3 9	6 3
European:						
Linares	15,000	3 0 0	1 0	Mar., 1903	2 10 0	3 0 0
Mason & Barry	185,172	1 0 0	11 0	May, 1903	3 10 0	3 15 0
Rio Tinto	325,000	5 0 0	32 6	Nov., 1903	49 17 6	50 2 6
Rio Tinto, preferred	325,000	5 0 0	2 6	Nov., 1903	5 17 6	6 2 6
Tharsis	625,000	2 0 0	6 0	May, 1903	4 12 6	4 17 6
West Australian:						
Associated	495,388	1 0 0	2 0	Jan., 1904	2 12 6	2 15 0
Cosmopolitan	400,000	1 0 0	1 0	May, 1903	15 3	15 9
Golden	300,000	5 0 0	6 0	Nov., 1903	8 16 3	8 18 9
Great Boulder	1,750,000	2 0	9	Dec., 1903	1 6 9	1 7 3
Great Fingall	250,000	1 0 0	8 0	Jan., 1904	8 1 3	8 3 9
Ivanhoe	200,000	5 0 0	5 0	Jan., 1904	8 16 3	8 18 9
Kalgurli	120,000	1 0 0	2 6	Jan., 1904	5 10 0	5 15 0
Lake View	250,000	1 0 0	rts.	Aug., 1902	1 8 9	1 11 3
Oroya-Brownhill	450,000	1 0 0	2 6	Dec., 1903	3 13 9	3 16 3
Miscellaneous:						
*Brilliant	100,000	1 0 0	1 0	Jan., 1904	2 17 6	3 2 6
Briseis	600,000	1 0 0	. .	. .	6	6 6
Broken Hill	960,000	8 0	1 0	Aug., 1903	1 8 6	1 9 6
Mt. Lyell	275,000	3 0 0	4 3	Sept., 1903	19 0	1 0 0
Mt. Morgan	1,000,000	1 0 0	3	Jan., 1904	2 2 6	2 7 6
Waihi	497,412	1 0 0	2 6	Dec., 1903	4 17 6	5 0 0
Indian:						
Champion Reef	513,832	10 0	6 6	Jan., 1904	8 1 3	8 3 9
Mysore	595,043	10 0	4 4	Jan., 1904	6 11 3	6 13 9
Nundydroog	484,000	10 0	1 6	Nov., 1903	2 3 9	2 6 3
Ooregum	343,000	10 0	9	Dec., 1903	1 1 3	1 3 9
Ooregum, preferred	240,000	10 0	1 9	Dec., 1903	1 11 3	1 13 9
South African:						
Angelo	600,000	1 0 0	4 0	Jan., 1904	6 10 0	6 15 0
Bonanza	200,000	1 0 0	10 0	Feb., 1904	2 3 9	2 6 3
British South Africa	4,436,019	1 0 0	rts.	May, 1899	2 2 4	2 3 6
Cape Copper	300,000	2 0 0	4 0	Jan., 1904	3 2 6	3 7 6
Cape Copper, preferred	75,000	2 0 0	1 9	Jan., 1904	3 0 0	3 5 0
City & Suburban	340,000	4 0 0	8 0	Feb., 1904	6 11 3	6 13 9
Consol. Gold-Fields	2,000,000	1 0 0	. .	. .	6 3 9	6 6 3
Crown Reef	120,000	1 0 0	20 0	Oct., 1903	17 0 0	17 10 0
De Beers	800,000	2 10 0	10 0	Jan., 1904	19 3 9	19 6 3
De Beers, deferred	1,000,000	2 10 0	15 0	Jan., 1904	19 17 6	20 0 0
East Rand	990,000	1 0 0	5 0	Aug., 1903	6 13 9	6 15 9
Ferreira	90,000	1 0 0	22 6	Feb., 1904	19 10 0	20 0 0
Geldenhuis	200,000	1 0 0	6 0	Feb., 1904	6 2 6	6 5 0
Geduld	400,000	1 0 0	rts.	Mar., 1902	6 3	6 5 0
Henry Nourse	125,000	1 0 0	10 0	Feb., 1904	8 12 6	8 17 6
Jubilee	50,000	1 0 0	5 0	Feb., 1904	4 12 6	4 17 6
Jumpers	100,000	1 0 0	5 0	Aug., 1899	3 0 0	3 5 5
Langlaagte	470,000	1 0 0	2 0	Feb., 1904	3 11 3	3 13 9
May	288,750	1 0 0	3 6	Feb., 1904	4 0 0	4 2 6
Meyer & Charlton	100,000	1 0 0	5 0	Jan., 1904	5 12 6	5 17 6
Modderfontein	290,000	1 0 0	rts.	Apr., 1902	8 8 9	8 11 3
Namaqua	94,331	2 0 0	3 0	Dec., 1903	3 0 0	3 5 0
New Jagersfontein	200,000	5 0 0	10 0	Dec., 1903	28 2 6	28 7 6
New Primrose	325,000	1 0 0	3 0	Jan., 1904	3 13 9	3 16 3
Rand	1,795,956	5 0	4 0	Aug., 1902	9 11 3	9 12 6
Robinson	750,000	5 0 0	5 6	Feb., 1904	9 12 6	9 17 6
Robinson Deep	950,000	1 0 0	3 0	Jan., 1904	5 5 0	5 10 0
Rose Deep	425,000	1 0 0	2 6	Feb., 1904	7 15 0	8 0 0
Salisbury	100,000	1 0 0	2 0	Mar., 1899	1 12 6	1 17 6
Sheba	1,075,000	1 0 0	6	July, 1899	11 3	12 6
Village	400,000	1 0 0	3 0	Feb., 1904	7 7 6	7 12 6
Wemmer	80,000	1 0 0	10 0	Jan., 1904	11 0 0	11 10 0

*Ex-dividend.

LONDON (By Cable.)*

Company.	Jan. 20 £. s. d.	Jan. 27 £. s. d.	Company.	Jan. 20 £. s. d.	Jan. 27 £. s. d.
Anaconda	3 17 6	3 5 0	El Oro, Mex	1 3 1½	1 4 4½
British So. Africa	2 3 9	2 1 3	Modderfontein	8 8 9	8 7 6
Camp Bird	1 5 10¼	1 6 0	Rand Mines	9 13 9	9 7 6
Con. Gold Fields	6 8 9	6 3 9	Rio Tinto	50 7 6	48 16 3
De Beers	20 2 6	19 16 3	Simmer & Jack	1 11 3	1 11 3
East Rand	6 13 9	6 11 6	Tomboy	1 12 6	1 12 6

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Jan 7

Company.		Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Anzin, Coal	France			290.00	5,570.00	5,540.00
Boleo, c	Lower Cal	12,000,000	500	62.50	1,750.00	1,765.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	19.00	20.00
Courrieres, Coal	France	600,000	300	110.00	2,895.00	2,850.00
Fraser River, g	Brit. Col	250,000	25		5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	5.00	78.00	77.00
Laurium, z. l	Greece	16,300,000	500	25.00	343.00	335.00
Malfidano, z	Italy	12,500,000	500	50.00	560.00	530.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	493.00	485.00
Mokta-el-Hadid, i. l	Algeria	18,312,000	500	40.00	835.00	805.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	509.00	502.00
Penarroya, Coal	Spain		500	45.00	1,130.00	1,100.00
Vielle Montagne z	Belgium	9,000,000	30	30.00	675.00	680.00
Wyoming, c	California		25		320.00	326.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

ST. LOUIS, MO.* Jan. 23

Name.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo	$10	$0.25	$0.50
Catherine Lead, Mo.	10	.90	1.50
Central Coal & C	100	56.50	59.00
Central C. & C., pf.	100	67.00	74.00
Central Lead, Mo	100	110.00	115.00

Name.	Par Val.	Prices. Bid.	Prices. Ask.
Columbia Lead, Mo.	$10	$3.00	$4.50
Con. Coal, Ill	100	20.00	21.00
Doe Run Lead Mo.	100	110.00	115.00
Granite Bimet. Mt.	10	.42	.50
St. Joe Lead, Mo.	10	15.25	17.00

*By our Special Correspondent.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Carborundum, f.o.b. Niagara Falls, Powd.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.: Abbott (Turkey)	lg. ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h.gr.	"	26.00
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01½@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.05
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N. J.	"	.06
ALCOHOL—Grain	gal	2.46@2.48
Refined wood, 95@97%.	"	.50@.55
Purified	"	1.25@1.30
ALUM—Lump	100 lbs.	1.75
Ground	"	1.85
Porous	"	1.00
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08¼
Muriate gram	"	.05⅝
Lump	"	.09½
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¾
Oxide, com'l white, 95%	"	.03½
Com'l white, 95%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White	"	.03@.03½
Red	"	.06⅜@.06½
ASPHALTUM—		
Barbadoes	"	.02½@.03
Ventura, Cal	sh. ton	32.00
Cuban	lb.	.01¼@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh. ton	35.00
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	sh. ton	21 00
Gilsonite, Utah, ordin'y	lb.	.03
Select	"	.03¾
BARIUM—		
Carb. Lump, 80@90%	sh. ton	$25.00@27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100 lbs.	1.67½@1.70
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05¾
BARIUM—		
Sulphate (Blanc Fixe)	lb.	$0.02
BARYTES—		
Am. Crude, No. 1	sh. ton	9.75
Crude, No. 2	"	8.00
Crude, No. 3	"	7.00
Floated	"	18.50
Foreign gray	"	13.50
Snow white	"	17.25
Floated	"	18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton	5.50
Second grade	"	4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02½@.02¼
BORAX	"	.07¼@.07½
BROMIDE—Bulk	"	.48
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.40
" brown	"	.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton	70.00
Carbonate, ppt	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.50@1.75
Foreign	"	1.75@2.25
"Rosendale," 300 lbs	"	.80
Slag cement,	"	1.25@1.50
CERESINE—		
Orange and Yellow	lb.	.13
White	"	.14
CHALK—Lump, bulk	sh. ton	3.00
Ppt. per quality	lb.	.04@.05¼
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg. ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINE—Am. com., exdock, N. Y.	lg. ton	8.25
Am. best, ex-dock, N. Y	"	9.25
English, common	"	10.75
Best grade	"	16.75
Fire Clay, ordinary	sh. ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.50
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—Bulk	100 lbs.	.47½
In bbls	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitroglycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.12½@.12⅝
FELDSPAR—Ground	sh. ton	@10.00
FLINT PEBBLES—Danish. Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Lump	sh. ton	8.00@10.00
Ground	"	11.50@13.50
FULLER'S EARTH—Lump	100 lbs.	$.80
Powdered	"	.85
GRAPHITE—Am. f.o.b. Providence, R.I., lump	sh. ton	8.00
Pulverized	"	30.00
Am. pulv., other than R. I., f. o. b., New York	"	45.00
Best flake	"	150.00
German, com. pulv	lb.	.01¼@.01½
Best pulverized	"	.01½@.02
Ceylon, common pulv	"	.02¾@.03½
Best pulverized	"	.04@.08
Italian, pulverized	"	.01¼
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—Ground.		
American best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100lbs	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l.	"	.01¼
True	"	.04
Oxide, pure copperas color	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	lb.	.08½ @ .8¾
Brown	"	.06½@.06¾
Nitrate, com'l	"	.06¼
" gran	"	.08¾
LIME—Com., abt. 250 lbs	bbl.	.80
Finishing	"	1.00
MAGNESITE—Greece.		
Crude (95%)	lg. ton	5.00@5.50
Calcined	sh. ton	15.50
Bricks, best imp., f.o.b. N.Y.	M.	155.00
Bricks, domes., per qual., f.o.b. Pittsburg	"	160.00@200.00
MAGNESIUM—		
Carbonate, light, fine pd	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95
MANGANESE—		
Crude powd. 70@75% binoxide	lb.	.01¼@.01½
75@85% binoxide	"	.01½@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore	unit	.18@.20
MARBLE—Flour	sh. ton	6.00@7.00
MERCURY—Bichloride	lb.	.77
MICA—N. Y. gr'nd, coarse	sh. ton	33.00@38.00
Fine	lb.	.00⅞@.02
Sheets are sold as to size and quality		
MINERAL WOOL—		
Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL—Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 20 gr. 25@30, cold test	gal.	13@.13¾
15, cold test	"	.13¾@.14¼
Zero	"	.18¼@.19¼
Summer	"	.12¾@.13¼
Cylinder, dark steam ref	"	.14¼@.16¼
Dark, filtered	"	.18¼@.19½
Light, filtered	"	.20¼@.21¼
Extra cold test	"	.24¾@.31¾
Gasoline, 86 @90°	"	.17@.22
Naphtha, crude, 68°@72°	bbl.	12.40
"Stove"	gal.	.15
Linseed, domestic raw	"	.38@.40
Boiled	"	.42
Calcutta, raw	"	.65
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	10¼
Best	"	.14
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd.	"	.05¼@.05¾
English Glassmakers'.	"	.08½@.08⅝
Metallic, brown	sh. ton	19.00
Red	"	16 00
Ocher, Am. common	"	8.50@9.00
Best	"	21.25@25.00
Dutch, washed	lb.	.03
French, washed	"	.01¼@.01¾
Orange mineral, Am.	"	.07⅝@.07¾
Foreign, as to make	"	.08½@.10¼
Paris green, pure, bulk	"	.11
PAINTS AND COLORS—		
Red lead, American	lb	$0.06¼@$0.06½
Foreign	"	.07@.08¼
Turpentine, spirits	gal.	.58 @.63½
White lead, Am., dry	lb.	.04¾@.05
American, in oil	"	.05¼@.06½
Foreign, in oil	"	.09 @.09½
Zinc, white, Am., ex. dry	"	.04⅝@.04¾
Foreign, red seal, dry	"	.06@.06½
Green seal, dry	"	.03½@.09½
POTASH—		
Caustic, ordinary	"	.04½@.04⅞
Elect. (90%)	"	.06¼
POTASSIUM—		
Bicarbonate cryst	"	.08¼
Powdered or gran	"	.14
Bichromate, Am	"	.08½@.08¼
Scotch	"	.08½@.09
Bromide	"	@.80
Carbonate (80@85%)	"	.03½@.04⅝
Chlorate, powdered	"	.06¾@.07¼
Crystals	"	.06½@.07
Chromate	"	.35
Cyanide (98@99%)	"	.19¼@.20
Kainit	lg. ton	9.50
Manure salt, 20%	100 lbs.	.66
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09½@.09⅝
Prussiate, yellow	"	.14½@.14¾
Red	"	.36 @.36¾
Sulphate, 90%	100 lbs.	2.11
96%	"	2.14
Sylvanit	unit	.41
QUARTZ—(See Silica.)		
SALT—N. Y. com. fine 280 lbs.	bbl.	.72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETER—Crude	100 lbs.	3.45@3.60
Refined	"	4.00@4 50
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.36¾
Oxide	"	.85@1.10
SODIUM—		
Bicarb., ord., bulk f.o.b. works	100 lbs.	1.30
Extra domes., f. o. b. works	"	3.50
Bichromate	lb.	.06¾
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.	.72½@.80
Foreign, f.o.b. N. Y.	"	.90@.92½
Caustic, 70@76%, f. o. b. works	"	1.75@1.90
Foreign, f.o.b. N. Y.	"	1.90@1.95
Chlorate, com'l	"	.06¾@.07
Hyposulphite, Am	"	1.60@1.65
German	"	1.70@1.90
Nitrate, spot and nearby	"	2.15
Shipments	"	2.02½@2.08
Peroxide	lb.	.45
Phosphate	"	.02½@.02¾
Prussiate	"	.10½
Sal soda, f.o.b. works	100 lbs.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lbs.	.82½
Sulphide, crystals, bbl.	lb.	.01¾
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.20
TALC—N. C., 1st grade	sh. ton	20.00
N. Y., Fibrous, best	"	10.28
French, best	100 lbs.	2.00
Italian, best	"	2.25
TAR—Regular	bbl.	2.30
Oil, bbl	"	4.00
TIN—Crystals, bbl	lb.	.21½
Oxide	"	.35
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@09⅞
Carbonate, ppt	"	.09
Chloride solution, com'l	"	.02¾
Chloride granular	"	.15
Dust	"	.04¾@.04⅞
Sulphate	"	.02½@.02⅝

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.35
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07⅞@.08¼
THORIUM—Nitrate 49@50%.	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.